SMITHSONIAN INSTITUTION LIBRARIES

SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION
LIBRARIES

Jul 26 1965
Library
Patuxent Wildlife Research Center

VOL. LXVIII • No. 1 • JAN.-FEB., 1965

ANIMAL KINGDOM

THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

NEW YORK ZOOLOGICAL SOCIETY

General Offices: 630 Fifth Avenue, New York, N. Y. 10020

PRESIDENT	*VICE-PRESIDENT*	*SECRETARY*	*TREASURER*	*ASSISTANT TREASURER*
Fairfield Osborn	Laurance S. Rockefeller	John Elliott	David Hunter McAlpin	Eben Pyne

EXECUTIVE COMMITTEE

Laurance S. Rockefeller
Chairman
George F. Baker, Jr.
John Elliott
Henry Clay Frick
Peter Gimbel
Robert G. Goelet
David Hunter McAlpin
Fairfield Osborn

BOARD OF TRUSTEES

Class of 1965
Charles W. Engelhard
Peter Gimbel
Robert G. Goelet
John N. Irwin, II
Warren Kinney
Howard Phipps, Jr.
John Pierrepont
Chauncey Stillman
Landon K. Thorne, Jr.

Class of 1966
Robert E. Blum
William R. Coe
C. Suydam Cutting
Childs Frick
Henry Clay Frick
Otto Marx, Jr.
David Hunter McAlpin
G. W. Merck
Richard C. Patterson, Jr.
John H. Phipps
Alfred G. Vanderbilt

Class of 1967
Alexander Aldrich
George F. Baker, Jr.
John Elliott
Robert I. Gannon
Peter Grimm
Fairfield Osborn
Eben Pyne
Laurance S. Rockefeller
John M. Schiff
Henry Sears
Joseph A. Thomas
Robert Winthrop

Ex-Officio:
The Mayor of the City of New York, Hon. Robert F. Wagner
The Commissioner of Parks, Hon. Newbold Morris

STAFF: Zoological Park, Aquarium & Other Society Activities

William G. Conway . . . . *Director, Zoological Park*
Paul Montreuil . . . . . *Director, Aquarium*
John Tee-Van . . . . . *General Director Emeritus*
Christopher W. Coates . *Director Emeritus, Aquarium*

ZOOLOGICAL PARK

Joseph A. Davis, Jr. . . . . *Curator, Mammals*
Grace Davall . . *Assistant Curator, Mammals & Birds*
Roland Lindemann . . . . . *Consultant in Mammal Management*
William G. Conway . . . . . *Curator, Birds*
Joseph Bell . . . . . *Assistant Curator, Birds*
Herndon G. Dowling . . . . . *Curator, Reptiles*
Victor H. Hutchison . *Research Associate in Herpetology*
Charles P. Gandal . . . . . *Veterinarian*
Gordon Cuyler . . . . . *Membership Chairman & Administrative Associate*
Herbert J. Knobloch . . . . . *Curator, Education*
Jerry M. Johnson . . . *Designer, Dept. of Exhibition*
Charles B. Driscoll . . . *Superintendent, Operations*
Edward Kearney . . . . *Manager, Facilities Dept.*
Lee S. Crandall . . . . *General Curator Emeritus*

AQUARIUM

Carleton Ray . . . . . *Curator*
Joseph Geraci . . . . . *Associate Curator*
Ross F. Nigrelli . *Director of Research and Pathologist*
Klaus D. Kallman . . . . . *Geneticist*
Jewell Bungay . . . . . *Business Manager*
Aage Olsen . . . . . *Superintendent*
Morris H. Baslow . . *Research Associate in Physiology*
C. M. Breder, Jr. . *Research Associate in Ichthyology*
Harry A. Charipper . . *Research Associate in Histology*
Sophie Jakowska . . . . . *Research Associate in Experimental Biology*
Louis Mowbray . . *Research Associate in Field Biology*
Martin F. Stempien, Jr. . . . . *Research Associate in Bio-Organic Chemistry*

GENERAL

Herbert F. Schiemann . . . . . *Comptroller*
Walter Lerchenfeld . . . . . *Assistant Comptroller*
Harold C. Palmer . . . . . *Assistant Secretary*
John J. McKew . . *Personnel Manager & Assistant to the Director, Zoological Park*
William Bridges . . . *Editor & Curator, Publications*
Dorothy Reville . . . . . *Editorial Assistant*
Sam Dunton . . . . . *Photographer*
Henry M. Lester . . . . . *Photographic Consultant*
William H. Eddy, Jr. . . . . *Associate in Education*

DEPARTMENT OF TROPICAL RESEARCH

Jocelyn Crane . . . . . *Director*
Michael Emsley . . . . . *Assistant Director*

Associates

Jane Van Z. Brower
Lincoln P. Brower
William G. Conway
Julie C. Emsley
William K. Gregory
Donald R. Griffin
David W. Snow
John Tee-Van

AFFILIATE

L. Floyd Clarke, *Director*
Jackson Hole Biological Research Station

CONSERVATION FOUNDATION

Wallace D. Bowman
Paul Brandwein
George E. Brewer, Jr.
F. Fraser Darling
Noel D. Eichhorn
John C. Gibbs
John P. Milton
Martha Munzer
Samuel H. Ordway, Jr.
William Vogt

AFFILIATE

Richard A. Cooley, *Director*
Alaska Research Station, Juneau

ANIMAL KINGDOM

Bulletin of the New York Zoological Society

In This Issue

Black-necked Stilts in the Marsh Exhibit
Sam Dunton **Cover**

Counting Elephant Seals On Punta Norte
William G. Conway **2**

"Mammals of the World"
Joseph A. Davis, Jr. **13**

Zoo & Aquarium News in Pictures
Sam Dunton **15**

A Tangle of Serpents
Herndon G. Dowling **18**

The Silky-Flycatcher
Alexander F. Skutch **22**

News from the Conservation Foundation **28**

Behind the Scenes **29**

Vol. LXVIII FEBRUARY 1965 No. 1

Issued bi-monthly by the New York Zoological Society at the New York Zoological Park, Bronx Park, Bronx 60, N. Y. Editorial and Subscription Offices at the same address. Title registered with United States Patent Office ● Subscription, $3.50 a year; single copy, 60 cents. Same rates for all foreign countries and Canada. Second-class postage paid at Bronx, N. Y. Send Form 3579 to Bronx 60, N. Y.

The Tide Is Running Strong

THESE ARE propitious times for our institution. It is not difficult to identify some of the reasons for this happy state of affairs. A principal one is that, with the increase of mechanization and urbanization, great numbers of people in every walk of life feel the need to maintain contact with nature and its wonders. This deep and indeed urgent desire is manifested in many ways. An obvious one, for instance, is that presently more books on nature and animal life are being published than ever before.

It is true that animals have fascinated mankind since earliest times. The first zoo on record was built in China in 1100 B.C. Yet today our attitude towards animals is greatly changed, principally because so much is being learned of their social lives, of their intelligence and other capacities such as their use of sonar and radar. Animals are no longer being thought of as *dumb beasts*. As our knowledge of them increases so does our realization that they have many affinities with ourselves.

There was an earlier day, too, when the principal objective was to destroy wild animals. Now there is growing and widespread sympathy for them as a consequence of the worldwide threat to their survival. This situation is attracting the interest of innumerable people in the pressing need of wildlife protection. It is manifest in the gifts made so generously to our own Society to enable us to broaden and intensify our work in this field.

These trends give the work of our Society new meaning and will surely continue to do so in the years ahead. Creative influences pervade much that our Society is presently doing and planning. The extensive development programs now going forward at the Zoological Park and Aquarium are adopting concepts and techniques unthought of not so many years ago. The recently opened exhibit building for "water birds" at the Zoological Park, so rich in beauty and interest, is a portent of things to come as our plans go forward.

The new Laboratory of Marine Sciences, about to be constructed adjacent to the Aquarium, is another thrust forward to extend knowledge concerning marine life. Similarly, the new Department of Behavioral Sciences that we are establishing this year represents another attempt to learn more of animals, their motivations and behavior, which now at last are recognized as having many relevances to human behavior.

The tide is running strong, the time is favorable and all the signs are propitious for the future growth of the Society's activities.

Fairfield Osborn

A Day in a Patagonian *Elefanteria*—

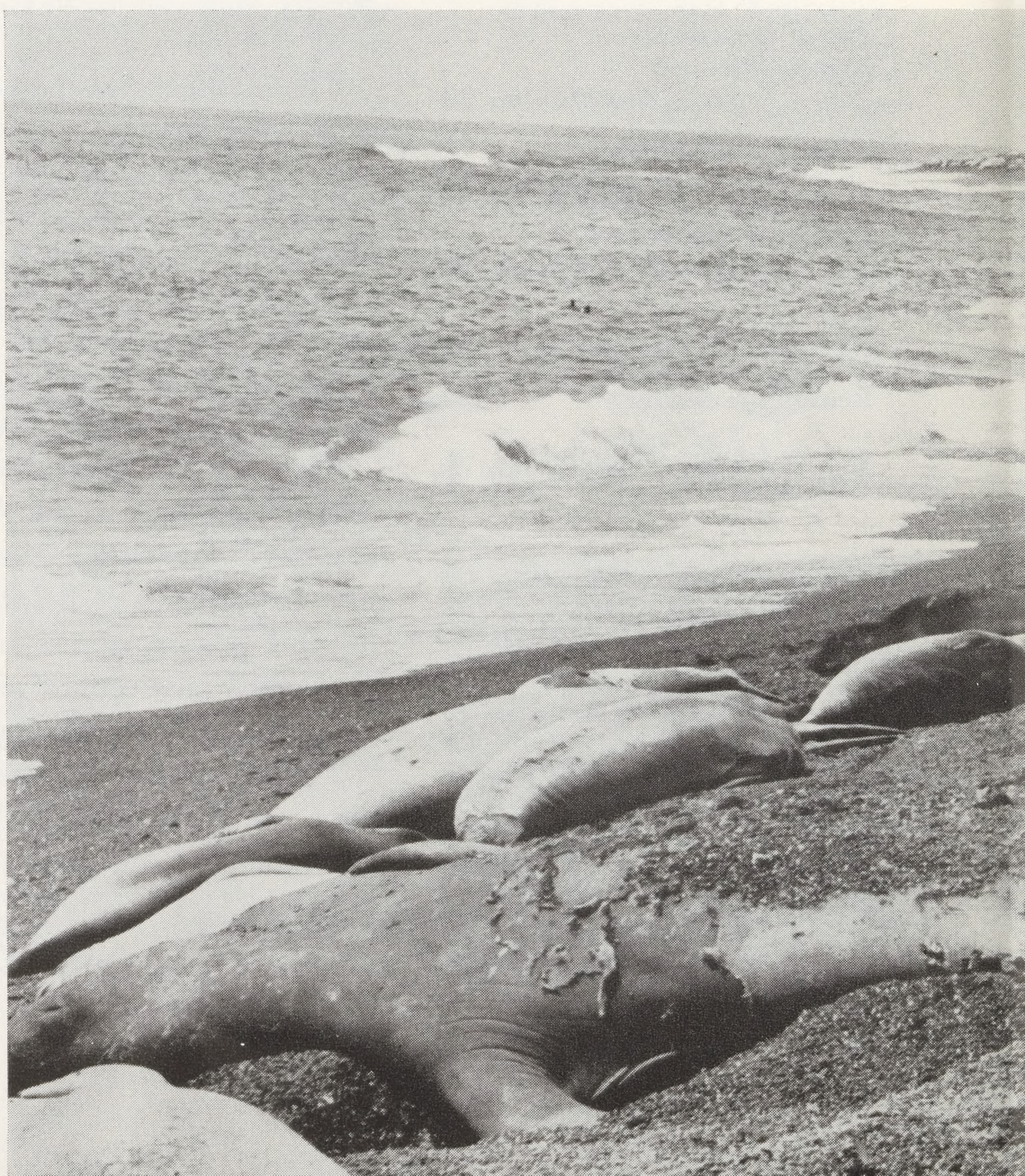
COUNTING ELEPHANT SEALS ON PUNTA NORTE

By WILLIAM G. CONWAY

Director, The Zoological Park

Photographs by the Author

IF YOU REALLY WANT to know how many animals there are at one place at one time, you should count them. If they are elephant seals, it's as easy as falling off a log. In fact, elephant seals sometimes look like logs and when they distribute themselves like ties on a trolley track along several miles of magnificent beach, taking their census is a delight. Huge, stoic mammals sleeping along a gently shelving shore, bathed in Patagonian sunlight and pounded by blue-green waves. . . .



Elephant seals were distributed along miles of gentle beach at Argentina's Punta Norte and an accurate count was easily made. There were 1,387 of the animals — a good comeback from the herd of 220 estimated in 1954.

It was on December 4 that Robert G. Goelet, the leader of our Argentine movie expedition which included Dr. William H. Drury, Research Director of the Massachusetts Audubon Society, and myself, scheduled a count of Southern Elephant Seals at Punta Norte on the Peninsula Valdes, probably the only *elefanteria* remaining on the South American continent. Through the kindness of a friend of Bob's, Señor Carlos Gutierez, the hospitality of a superb estancia on the Peninsula itself was extended to us. Therefore, as the guests of Estancia La Adela, owned by Señor E. J. Ferro, and its gracious manager Señor Perez Macchi, we were able to base our operations within the remote Peninsula rather than a hundred miles away on the mainland. We wanted to check on the status of the seal colony, observe the animals' behavior and, finally, photograph the *elefantes* for a film on the wildlife of Argentina — a film we hope will create greater awareness of the interest and value of Argentina's unique fauna and thereby contribute to its conservation.

Patagonia's Peninsula Valdes is in the province of Chubut. We were about as far south of the Equator (42°20′ S) as New York is north, but further than this comparisons are fruitless. Jutting out in the sea as it does, the Peninsula is probably not quite as dry as most of Patagonia at its latitude, but it is every inch desert scrub. While usually classified as "semi-arid," its annual rainfall averages only 8.6 inches, well below the "less than 10 inches" standard for most deserts. The Peninsula's comparatively moderate temperatures and fogs seem basically responsible for the dense dry bushes and grasses that manage to survive on its gravelly yellowish soil. Occasionally it does get as hot as 100°F., and the mercury sometimes dips below 32°F. on the coldest days of winter, but sunstroke is unheard of and snow quite ephemeral on the rare occasions it appears. The preeminent ingredient of Patagonian weather is wind.

Buffeting wind is almost constant. Its velocity must be felt to be appreciated. Mostly southwest and northeast, driving sand and dust for hours without respite, the wind is the bane of the wildlife photographer. It scars his lenes, fouls his cameras and vibrates his tripods. My fully loaded movie camera, firmly mounted on its tripod, was blown over on one occasion and we began to put some credence in the local Patagonian joke: It

Oil and hide hunters left this boneyard when they exploited the colony on Punta Norte. The bones and skins are mostly those of sea lions and there has been no killing in recent years.

isn't necessary to travel to see Patagonia; if you stand in one place long enough it will all blow past! But, after all, we were in "the roaring forties" and obviously the *elefantes* would not be moved by the breeze.

As a matter of fact, it takes a good deal to move a sea elephant, as the big seals are often called. They are truly huge animals. An adult male is said to measure 21 or even 22 feet long and to weigh as much as 8,000 pounds, a figure I accept with reluctance. Four tons is a good weight for a cow Asiatic elephant; I mean a real elephant. Perhaps the few weights of elephant seals that have been published for captive animals have prejudiced me, for the very biggest was only 4,821 pounds. That was "Goliath," the famous Southern Elephant Seal imported by Hagenbeck in 1926. But, of course, Goliath was only 16½ feet long. Compare hippopotamuses or rhinoceroses to elephant seals. One of the heaviest reliably recorded weights for a big male hippo is only 5,872 pounds, and the best weight for a male Indian Rhinoceros may be that of the breeding male at the Basle Zoo, only 4,554 pounds. While White Rhinos are said to weigh from three to four tons, figures from actual weighings are not readily available. Thus the elephant seal may well be the second largest mammal to produce its young on land, for real elephants are clearly in the lead, as we know from the work of an endocrinologist, George Crile, who dismembered and weighed a huge African bull elephant. The sum of its parts was 14,641 pounds.

But weighing eight thousand pounds – more or less – there is no doubt that the elephant seal is the largest of the pinnipeds and more than twice the weight of its nearest competitor, the walrus. Consequently, even small elephant seals are not hard to see, and we anticipated no difficulties after finding our way, with Señor Macchi as guide, to Punta Norte's great beach. We divided our crew and headed west and east, planning to count as we walked.

The population of the Southern Elephant Seal was summarized in 1958 by Victor Scheffer from various reports as 380,000 to 660,000. The big seals have made a comeback since the days of the 19th century when they were being killed by the thousands for the oil contained in their blubber. Even the Northern Elephant Seal, which differs most obviously from its southern cousin in its longer proboscis (which may hang ungracefully below its chin), a one-time inhabitant of the waters from Point Reyes, California, to Baja California, has made a comeback. From near extinction in 1870 its population has steadily

climbed and is now estimated at 8,000 to 10,000. But continental colonies of the Southern, like that at Punta Norte, are rare. To animals which are poorly prepared to defend themselves on land, islands offer the great advantage that large predators are practically nonexistent. For this reason the unique Valdes *elefanteria* is of great interest, and our excitement was increased by the fact that no reports of its status had been made in a decade.

In 1952 an Argentine, Santiago Carrara, estimated 115 elephant seals at Punta Norte and in 1954 he published an estimate of 220. The beach is shared by Patagonian Sea Lions, and we had been told that the sea lions and perhaps a few elephant seals as well were once exploited for their skins and oil, but we were shocked to find that Punta Norte looked like a graveyard.

As I started tramping along the beach through the drifts of dark, rounded pebbles, my glance travelled over bleached skeletons and hundreds of piles of bone fragments. I had visions of a ghostly "elephant graveyard" and hopes for few seals in the flesh but closer examination revealed that almost all of the remains were those of sea lions. Most of the skeletons and skins were well bleached and badly deteriorated and it seemed likely, as we heard, that there had been no killing on the beach in a good many years. Bachelor bull sea lions were much in evidence, although no breeding harems could be seen. I suppose that Punta Norte is a gathering place for bulls too young or too weak to establish a harem, for we know the breeding season was underway elsewhere. In any event, elephant seals were everywhere.

Massive, unconcerned, sleeping behemoths were quietly occupying a beach that stretched on seemingly without end. No hot dog stands, no motorboats, no airplanes overhead; it could have been Pleistocene times. Observing elephant seals on their own beach was not an experience I had ever expected to enjoy, and as I watched the huge creatures it occurred to me how easy it would be for thousands of people to enjoy the same experience if the animals can be protected, for Punta Norte can be made readily accessible. Only the seal tribes, among the big carnivores, are social enough to gather in great aggregations, and there was something grave, even awesome, about this group – a social dignity in their sheer numbers that animals enveloped in barrels of blubber have difficulty preserving as individuals.

There were big elephant seals and little elephant seals, medium-sized elephant seals and, occasionally, very big elephant seals. Many were molting, shedding not only hair but layers of skin as well, and their covering appeared to be in tatters. They looked absolutely miserable, and I was pleased in a perverse sort of way. For years I had worried about the appearance of elephant seals in captivity during their molt and wondered if their disreputable appearance might not be the result of some failure in their captive rations or care. Now I realized that they molt just as raggedly in the wild. It is just as complete and catastrophic as the molt of a penguin.

At first, I am slightly ashamed to admit, my ornithological background took hold when I

Water-filled pits are another reminder of the hunters — temporary storage for oil extracted from the animals. A great stack of hides may be seen at the top, alongside the automobile.

FEBRUARY 1965

noted a number of dead penguins on the beach. They were Magellanic Penguins and though dead they were still the first penguins I had ever seen in the wild. They were somewhat north of their usual haunts, but Bob saw and manged to photograph a live one which preened unconcernedly in front of a backdrop of elephant seals. Walking among the elephant seals and quite literally under their noses, were oystercatchers and sheathbills, the latter searching for food among the clumps of sea weed and shed *elefante* skin which littered the beach. I carefully watched them and even observed the Sanderlings and Falkland Plovers which raced up and down the beach, hoping to see some sort of relationship between the birds and mammals. Africa's tickbirds and crocodile birds had primed my imagination. Yet, while I don't doubt that the sheathbills would be perfectly capable of snatching anything edible that presented itself on the back of a sea elephant, the various species ignored each other in that wonderfully oblivious way unrelated wild creatures have. For us, the elephant seals were impossible to ignore for they were as audible as they were visible.

Occasionally an immense old male would rise up and, with head five or six feet in the air, inflate his short, bulbous nose and emit a powerful hammering declaration, a resonant, staccato thumping that might seem more appropriate from a pile driver. Yet it is a wild and thrilling sound and the only really respectable noise the animals seem to make. When disturbed by another sea elephant, or even a New York zoologist, a belching, hissing roar is the usual response. Or sometimes only a growling sort of gurgle. But this is not to say that elephant seals are a quiet lot when undisturbed; they are noisy even when asleep.

Sleeping sea elephants breathe stertorously but normally enough for a while and then stop breathing altogether for five minutes or more. If the observer gets too close, he is sure to regret it, for the *elefante* is all too prone to resume breathing (about the time you fear he has died) with a belch or an abrupt gooey snort. At any time, elephant seals are likely to emit a great many sounds which fall coarsely on human ears. Much is explained by the studies some years ago of R. M. Laws, who measured the intestine of a bull elephant seal and found it to be 662 feet long – 42 times the animal's body length. With so much digestion going on, it is not surprising that the digestive noises of elephant seals are prodigious.

A sleeping elephant seal may go several minutes without breathing, and then awake with a "gooey snort" to stare at an intruder. Asleep or awake, it is constantly making loud sounds.

Inevitably we began to wonder what the seals were eating that kept them so incredibly fat and, for that matter, *when* they ate. They seemed to spend all their time sleeping on the beach. We checked a number of non-molting individuals in the morning when we arrived and found them still sleeping blissfully in the same place when we left in the evening. I was sure they didn't just sneak off when I wasn't looking, for an elephant seal leaves a track in the shingle like a caterpillar tractor dragging a sequoia. Perhaps they feed at night. Most seals are probably more or less dark-adapted, for the major seal populations seem to range very far north or very far south, where the days are exceedingly short through six months of the year. The problem is a fascinating one. I saw three individuals with severe eye damage; big old males which had each lost one eye, perhaps in a fight – yet each animal appeared to be in excellent condition. I could not help but wonder if the elephant seal might not be using a sonar food-locating technique such as that which has recently been reported in various cetaceans and even in the California Sea Lion. Seals are said to have a poor sense of smell – something of an advantage for those elephant seals that must share a beach with other elephant seals, Bob pointed out! The big seals are capable of going long periods without food and this appears to be the key to their feeding pattern. L. Harrison Matthews, now Director of the London Zoo, has noted that males maintaining harems may get along without feeding for as long as two months during the breeding season, and Carl Hagenbeck once had a bull elephant seal which refused food for 100 days. Today biologists believe that the elephant seals go to sea to feed on a periodical or even seasonal basis and customarily fast for long periods during the molt and breeding seasons.

Southern Elephant Seals are thought to feed primarily upon squid. Although seaweed has been found in some stomachs, it was probably ingested more by accident than as an important item of food. Small sharks, squids and rays were found in the stomach of one wild Northern Elephant Seal but for an idea of quantity we must turn to zoo data. Hagenbeck has reported that 80 to 100 pounds of fish was sufficient to maintain the elephant seal "Goliath," but that he once consumed 385 pounds of fish in a day!

If we know less than we would like about the elephant seal's feeding habits, we do know something of its breeding biology and its early growth. There were no newborn elephant seals

An elephant seal moving across the beach in a succession of jerky motions leaves unmistakable tracks in the shingle. Many did not move all the time the expedition was on the beach.

at Punta Norte. A pup is easily recognized not only by size – a dainty infant of about 100 pounds is average – but also by color. It has a dark brown first pelage which gives way to a lovely soft grayish-ivory coat as it approaches weaning. "Approaches," however, is hardly a strong enough term. Laws, studying the *elefantes* of the Falklands, found that the weight of a newborn pup increased 50% the first week, doubled at eleven days, trebled at seventeen days and quadrupled at twenty-one days. The mother nurses the pup throughout this period of rapid development, usually without feeding herself. The beach at Punta Norte was littered with gray "weaners," as the sealers used to call them, and a more appealing little seal is hard to imagine. The big dark eyes are set in a short, oval, baby face, which always looks vaguely reproachful. The head itself merges with a 400- to 600-pound balloon of soft ivory gray. The presence of the youngsters was encouraging, for it indicated a strong breeding population.

We were disappointed at having missed the breeding season, for the elephant seal's breeding behavior is fascinating. While the fur seals and sea lions are famed for their huge colonies and the great harems of the males, polygyny among the "true seals" is rare. The elephant seal seems to be the only strongly polygamous member of its family, the Phocidae. Even the related Hooded Seal does not practice polygamy, while the Gray Seal bulls, which range along our own northeastern coasts, collect only a small harem and live in a less gregarious sort of colony.

As we walked along the shingle to count the elephant seals, it was evident that no particular organization determined the location of the animals. Big bulls, cows and "weaners" were mixed together in a helter-skelter fashion without respect to age or sex. This is not so during the breeding season, however. Then the big bulls establish a territory and a harem on the beach and defend them against other bulls. The harems are said to average twenty cows, where circumstances permit, and the male watches over the females with more vigilance than might be expected from such a lethargic creature.

Biologist Karl Kenyon managed to drive several bull sea elephants from their breeding territories and discovered that each came right back to the same place, thus demonstrating that the bull

Fighting is an important part of an elephant seal's life and youngsters often "play fight" on land or in the water, as here. Their blows may miss, whereupon they simply tumble over.

was defending a particular piece of ground, a territory, rather than just an area around himself. But R. Carrick, while working for Australia's wildlife research organization, found that the control exercised by the big bulls in the large harems of elephant seals on Macquarie and Heard Islands is not absolute. The beachmasters shared control of the seraglio with one or more assistants, each of which maintained surveillance over a particular group of cows. This system seems to make sense, for the sex ratio of sea elephants, like that of human being, tends to favor males.

the movie camera I was following a group of sheathbills strolling between the sleeping monsters with the nonchalance of Manhattan office workers among skyscrapers. Suddenly a bull in my viewer snorted and reared up with a roar. A bigger bull, with his nose perhaps five feet away, reared and roared in response. Then a slow advance began; heads turning slowly, mouths open widely, a staccato call, then a feint by one, now the other. Some of the feints were subtle, slight movements which I noted only after viewing the motion pictures that Bill Drury and I obtained at the time. Suddenly the large bull

A naturalist was able to lie down on a sleeping Northern Elephant Seal; the Southern does not seem quite so sluggish. Nevertheless Mr. Goelet could get very close to take pictures.

The polygynous breeding behavior of the elephant seal helps to explain the bull's huge size, two or three times that of the female. We find the same sexual size distinction in the polygynous fur seals and the sea lions while in Leopard and Weddell's Seals, and most other species that do not establish harems, the male may be smaller than the female or the same size. The bull elephant seal must be big to command a harem, for selection would favor big males over small ones in territorial fighting.

Fighting is not limited to the breeding season, however, and we soon witnessed some gargantuan battles between huge and not so huge males that seemed to develop for no reason at all. With

struck with his short tusks in a tremendously heavy downwards blow, executed with the whole front part of his body. The young bull struck back, and as I automatically counted, while film clicked through my camera, four seconds of rapid, short, blubber-shaking blows occurred. The young bull was pushed back and he suddenly raised his hind parts, lowered his head and, with mouth open defiantly, retreated down the beach toward the water. The larger bull slowly sank down on

Insects did not seem to bother the animals except around their faces. Occasionally they sought coolness in the water or buried their noses in the damp shingle.

By dextrous use of his flippers this big bull has partly excavated a snug bed for himself. He flips gravel onto his back, perhaps as a means of keeping cool.

the shingle again and simply went back to sleep. I could see no trace of a wound on either contestant, but scars were so common on most of the larger bulls, and often on the cows as well, that battles must be far more serious during the breeding season. Yet the canine teeth of the elephant seal are short and rather blunt, and it seems doubtful that the big bulls could inflict wounds deep enough to seriously injure one another. Of course, their soft noses and eyes are easily torn. Young animals often play-fight, and we watched repeated clumsy bouts between youngsters in the water. Often their blows completely missed the adversary and the contestants fell over. The play was amusingly reminiscent of the mock battles of bear and lion cubs.

The disposition of the Southern Elephant Seal must be less sluggish than that of its northern cousin on Guadalupe, for a naturalist named Bartholomew was able to lie prone on a sleeping

Northern Elephant Seal. While it was possible, with care, to approach a sleeping *elefante* on Punta Norte, especially if his head was turned the other way, when the animal became aware of its visitor it was likely to act defensively or to hitch its way quickly toward the water. Bob had the temerity to gently tickle the posterior of one sleeping youngster, and the results were delightful. First a lazy, hand-like flipper reached back and scratched slowly, at least two feet short of the spot. Bob scratched again, junior itched again. Suddenly he became aware of our laughter, awoke with a start and looked back with the most wonderful appearance of outrage and consternation. Quickly assessing the situation, he swung his posterior away from us and faced about with a hiss and widely opened mouth.

Scratching is a major occupation of sea elephants. It is accomplished with the remarkably hand-like front flipper, an appendage quite different from that of the sea lion, which is elongated, enlarged and relatively inflexible. Like a penguin using its flippers, a sea lion uses his modified forelimbs as the primary organs of propulsion in the water. When he wants to scratch he usually does it as a dog does, with the hind leg or back flipper. In the true seals such as the elephant seal, the hind legs are more strikingly modified as swimming flippers. Thus the forelegs do not have major swimming responsibilities,

The front flipper is remarkably hand-like and with it the elephant seal can do all sorts of unlikely things in the way of scratching and rubbing, even cleaning its usually dirty nose.

although they are important in banking and turning. They are flexible, prehensile limbs with which the animal can scratch its side, rub its chin and even clean its nose. We photographed the *elefantes* doing all of these things and could never quite get over the improbability of it — they seemed too big and clumsy to have such dextrous "hands and arms."

I carefully catalogued the activities of resting animals in addition to scratching and found that they sleep most often on their bellies, but frequently enough on their sides and even on their backs. The drowsy way they move from one position to another is a pleasure to observe and it is as impossible to avoid anthropomorphic reminiscences while watching as it is to avoid yawning. They stretch and yawn, roll over, then sigh. And the pillow-like conformation of the little "weaners" is not overlooked by the larger seals. I watched one little fellow desperately attempting to avoid being used as a pillow by a huge bull. It all began when the scarred old male lunged and wobbled up from the water and laid his great wet head on the youngster's back. The little fellow took it for a minute or two but then struggled away. The bull promptly hitched after him and rested his head again; this time more firmly. The "pillow" again managed to squirm out from under but the bull pursued him still further up the shingle, finally pinning him with a flipper and resting his chin on the youngster's shoulders.

A seal sometimes constructs, unintentionally, a sort of bed in the gravel beaches as he sleeps. From time to time he reaches out with one forelimb or sometimes with both and shovels a flipperful of damp gravel up on his back. Eventually a sizeable excavation results and he may sink down in it a foot or more. Perhaps covering the back with gravel is an effort to keep cool. Insects did not seem to be a problem while we were present, except around the seals' faces. Occasionally an animal, perhaps annoyed by insects or just anxious to keep his nose cool, would rise slightly and dive forward into the gravel, burying his nose. As I walked and counted it seemed to me that males, in particular, buried their noses in this fashion.

My walk down the eastern sector of the beach had now extended to an estimated three and one-half miles and, while walking in the deep gravel was difficult, the hours seemed to have flown by. It was time to turn back. Although my count had not yet fully exhausted the beach of elephant seals, the major aggregations appeared to be behind me. In the distance I could still spy a few small groups of two and three animals widely scattered down the coast. My notebook tallied 1,201 elephant seals, a number far in excess of Santiago Carrara's 1954 estimate of 220, even without Bill Drury's count from the western sector of the beach. Our party reassembled at the car and we discovered that comparatively few animals had hauled out on the western beach. Bill had walked about as far as I had and, though he too could still see a few animals in the distance, his count was only 186. We were more than pleased with a total of 1,387 elephant seals and with the assessment of Punta Norte's population as a healthy, vigorous colony. But many questions remained and two of the most important were: Is there a great seasonal variation in numbers of elephant seals on the beach, thus explaining previous low estimates? Or, had the population truly increased, as a result of being undisturbed since the sealing efforts of a decade ago? These were questions we would be unable to answer, but unanswered questions are food and drink for zoologists.

"MAMMALS OF THE WORLD"

A Review by

JOSEPH A. DAVIS, JR.

Curator of Mammals

MAMMALS OF THE WORLD. By Ernest P. Walker and others, with a Foreword by Fairfield Osborn. Vols. I & II, pp. 1-1500; Vol. III (Bibliography), pp. 1-769. Profusely illustrated. The Johns Hopkins Press, Baltimore, 1964. Vols. I & II, $25.00; Vol. III, $12.50.

TWO MILESTONES in the literature of mammalogy appeared in 1964, both under the sponsorship of the New York Zoological Society. The first, Lee S. Crandall's monumental "Management of Wild Mammals in Captivity," is already a universally acclaimed classic. The second, Ernest P. Walker's "Mammals of the World," is travelling the same path. Within its first two volumes are assembled brief accounts of each of the more than 1,000 presently-recognized genera of living mammals, accompanied by illustrations of representative species. Each order and family is similarly defined, in a style that is nontechnical enough to be understood by readers whose interest in mammalogy is peripheral, yet trenchant enough for professional use.

Mr. Walker conceived his project in the early 1930s; it was an ambitious one requiring years of maturation, during which the author, an accomplished photographer himself, recorded photographically many of the smaller mammals at the National Zoological Park. The National Zoo, where Mr. Walker was assistant director for 27 years, has long had the largest and finest collection of small mammals in this country, and a number of the photographs of rarely seen species owe their existence to this happy combination. In 1957, sponsored by the New York Zoological Society, he received a grant from the National Institutes of Health and the actual preparation of the volumes began. Mr. Walker's difficult undertaking was hindered by serious illness, but the able assistants he had engaged carried on until he could again guide the work personally. Now "Mammals of the World" has been printed.

The reader will find, if he looks first at the index, everything from that old stand-by, Aardvark, to Zogzog and Zwijn. Mammalogists will find the genera ranging alphabetically from *Abrocoma* to *Zyzomys*, both significantly members of the largest order, Rodentia. The volumes themselves take one through the class Mammalia following the most universally accepted arrangement, from *Tachyglossus*, an echidna, to *Ovis*, the genus of sheep, beginning with one of the strangest of mammals and finishing with one of the most commonplace. Assembled in the first two volumes are photographs of some animals few men have ever seen alive; they will delight the zoologist who has hitherto known them only as names. Inevitably some genera are represented by photos of inexpertly mounted specimens, by study skins and skulls, or by drawings. In most cases these are the only available pictures of a representative of a genus, and the publisher invites anyone with a better picture to offer it for inclusion in future editions.

American and English readers who have not had occasion to deal with metric measurements may be a bit nonplussed to find that all measurements, with minor exceptions, are expressed in these units. Zoologists have long found the metric system superior to the English system of inches, feet and miles, and will welcome Mr. Walker's decision. As an aid to the reader to whom metric units are alien the author has thoughtfully sup-

The author, Ernest P. Walker, makes a recording of one of his subjects.

plied large, easily-read conversion scales on the end-papers, as well as a table of conversion formulas.

For a work of such great scope, "Mammals of the World" is remarkably free of serious errors, and those that are present — two of the genera (*Paraonyx* and *Platacanthomys*) are illustrated by photographs of the wrong animals, for example — are certain to be corrected in the next edition. One may disagree with certain statements of opinion and occasional errors of fact resulting from an uncritical acceptance of published accounts, but these are very minor flaws in what is unquestionably a major contribution to zoology. Nowhere else can one find in a single publication information on virtually all the recognized genera of mammals, or illustrations of typical individuals of them — in fact one could not find such a combination at all without duplicating the formidable labors of Ernest Walker and his assistants.

Volume III is a bibliography intended as an optional part of the set (a selected bibliography of some 4,500 titles appears in Vol. I). The number of entries in Volume III is not specified but by inference runs somewhere around 70,000. In spite of the fact that the subject headings are printed in a lighter typeface than the entries, and are therefore not always easy to discern, the third volume, with its taxonomic, geographic and subject sections, is sure to become one of the most used bibliographic references in the field of mammalogy. Such a bibliography in itself would be worthy of high praise; that it is only a part of Mr. Walker's project serves to indicate the magnitude of his achievement.

ZOO & AQUARIUM NEWS IN PICTURES

Photographs by

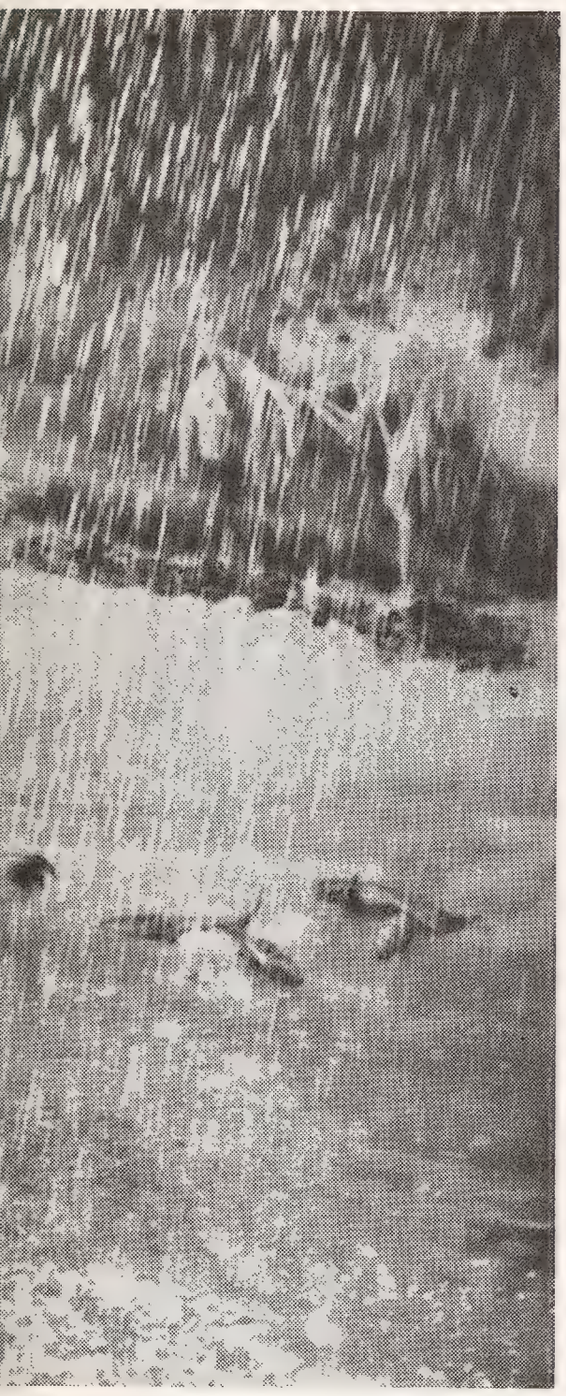
SAM DUNTON

Staff Photographer

Gray Seal pups in the top and bottom pictures were born at the Aquarium on January 13 and 18, respectively. At birth each weighed about 38 lbs. but in true seal fashion increased rapidly and on January 27 one weighed 90 lbs., the other 110 lbs. Both mothers came to the Aquarium in 1960 and their first pups, male and female, arrived in 1964.

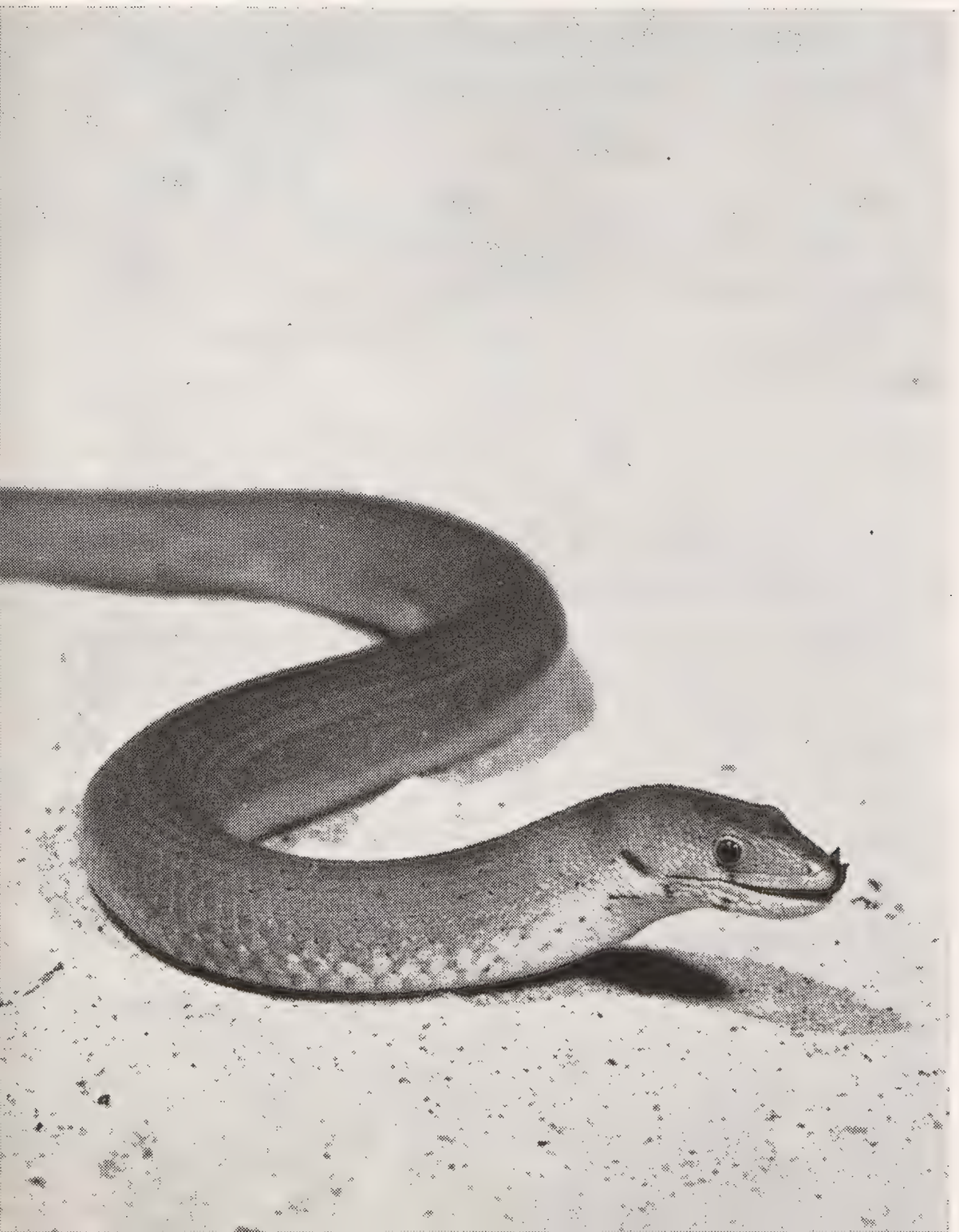
Cold as the winter has occasionally been up to now, our Polar Bears have kept their pool open and can swim every day. By this time next winter they may have a new home; we hope to start construction this spring of a new exhibit for Polar and Brown Bears.

One of the most-photographed birds in the new Aquatic Birds Building is the Indian Gray Heron, *Ardea cineraria rectirostris*. He poses readily and stands still.



This snake-like Scalyfoot Lizard, *Pygopus lepidopodus,* from Australia, is the first we have ever exhibited. It is light brown, about 15 inches long, and uses its tongue to clean dust from its lidless eyes. It was given to the Zoo by Stanley Oliver Grierson.

Walruses are not celebrated for their graceful necks, so it detracts little from the appeal of Olaf, the Aquarium's big Atlantic Walrus, to describe him as a face on a 2,800-lb. body. We expect him to level off at about 3,000 lbs.



A recent donation from an animal importer was marked "Three Squirrels." Inspection revealed that one "squirrel" was this Malaysian Tree Shrew. Its companions actually were squirrels. They came from Thailand, have not been identified, but are new to our collection.

The Puzzle of the *Bothrops;* or,

A TANGLE OF SERPENTS

By HERNDON G. DOWLING

Curator of Reptiles

WHEN COLUMBUS discovered the New World and landed in the West Indies, he found the Greater Antilles inhabited by a group of peaceful Indians called the Arawaks. However, they reported that the Lesser Antilles to the south were inhabited by a warlike man-eating group of Indians, the Caribs.

Ordinarily such human geography is of only marginal interest to the biologist and zoogeographer but in this case it is directly pertinent to the problems surrounding the West Indian pitvipers. A Carib tale is the connecting link.

According to this story, some hundreds of years before, when the Arawaks still inhabited the island of Martiniqué, bands of marauding Caribs came from their Orinoco delta homes to attack the Arawak villages. However, the Martinique defenders fought fiercely and drove the invaders away. The following year the Caribs attacked again, and were again repulsed. These battles continued for a long time but the Caribs were unable to wrest the island from the Arawak villagers. Finally one of the Carib chiefs thought of a new method of attack — the ultimate weapon.

Returning to their mainland home, the Caribs caught hundreds of venomous snakes. Stuffing the live serpents into baskets and calabashes, they set sail once more for Martinique, this time with a deadly cargo. Once again the Arawak defenders came forward to meet the foe. But instead of the onslaught of darts and stones expected, came a shower of baskets and gourds that released hordes of angry snakes. Faced with this unaccustomed danger, the Arawaks deserted their defenses and their villages and the Caribs were able to land. One boat, however, had become separated from the others and had released its cargo of serpents on the adjacent island of St. Lucia by mistake.

And this is how it happens that venomous snakes occur only on Martinique and St. Lucia of all the West Indies — or at least this is the story (or something like the story) that the Caribs told the French when they, in turn, occupied the island in 1635.

Of course, it is not quite true that Martinique and St. Lucia are the *only* West Indian islands inhabited by venomous snakes; Trinidad has venomous snakes as well. As I mentioned before, however (*Animal Kingdom*: 67(3)), Trinidad is not an "oceanic" island but at one time was part of the South American mainland — perhaps as recently as 8,000 years ago. The venomous snakes of Trinidad (in fact much of fauna of Trinidad) are the same as those of the adjacent mainland.

I became interested in the West Indian pitvipers in 1959 when Trustee Clay Frick sent us a rather queer-looking "Fer-de-Lance" which he had collected at the Marquis Plantation on St. Lucia. The snake's faded gray pattern more resembled a bleached museum specimen than the bright-liveried mainland snakes that bore that name. It was alive and lively, though, and proceeded to demonstrate that its coloration was no accident by producing 36 youngsters with equally faint patterns.

A search through the literature revealed that "conservative" herpetologists felt that there was only one kind of "Fer-de-Lance" and that it (*Bothrops atrox*) inhabited the West Indian islands of Martinique, St. Lucia and Trinidad as well as the mainland of South and Central America. Most current workers accepted this.

The appearance of our St. Lucian snakes contradicted such a solution, however, and a few dissident views were also found scattered through the technical journals. As long ago as 1928, J. Vellard had pointed out that the Fer-de-Lance of Martinique differed from mainland *Bothrops*

atrox in internal structure. More recently Alphonse Hoge had demonstrated that they also differed from their mainland relatives in scale characters.

No one seemed to have been concerned with the St. Lucia serpent, though, so I began to examine the few specimens of island pitvipers available in various museums. As soon as I did, one thing became evident. Not only did the snakes from Martinique differ from the mainland snakes, as Vellard and Hoge had indicated, and not only did the St. Lucia serpent differ from the mainland species as I had suspected — but also *the St. Lucia and Martinique pitvipers differed from one another!* If anything, they differed more from one another than they did from the mainland species!

Such a suggestion had not appeared in any of the recent literature but further digging revealed that Samuel Garman had recognized the St. Lucia snake as different in 1887 and had given it a name — *caribbaeus*. Garman was well-known as an enthusiastic describer of everything that walked, swam or flew, however. Though Boulenger had listed Garman's name in his comprehensive "Catalogue" of 1896, no one else, apparently, was interested and the name had disappeared from the scientific literature.

Admittedly, it was difficult to distinguish the museum specimens, most of which seemed to have been collected in the 1880s, and it became clear that fresh material (living, if possible) would be necessary to demonstrate conclusively that the island forms were really different from their mainland relatives.

In 1960 I went to Trinidad and was able to study the mainland species, *Bothrops atrox,* there. Meanwhile, Dr. Frick was attempting to obtain additional specimens of the St. Lucia snake from his friends on that island. The final blow to these attempts came when the snakes, having been collected with much labor and packed with care, were refused passage by the local airline office. By the time we heard of the difficulty and were able to convince the head office that such shipments were legal and ordinary, the snakes were dead.

It was not until the fall of 1964 that I was able to visit the islands of Martinique and St. Lucia and resume my study. Meanwhile, other workers had become interested in the problem too (but I did not realize *how* interested until my return).

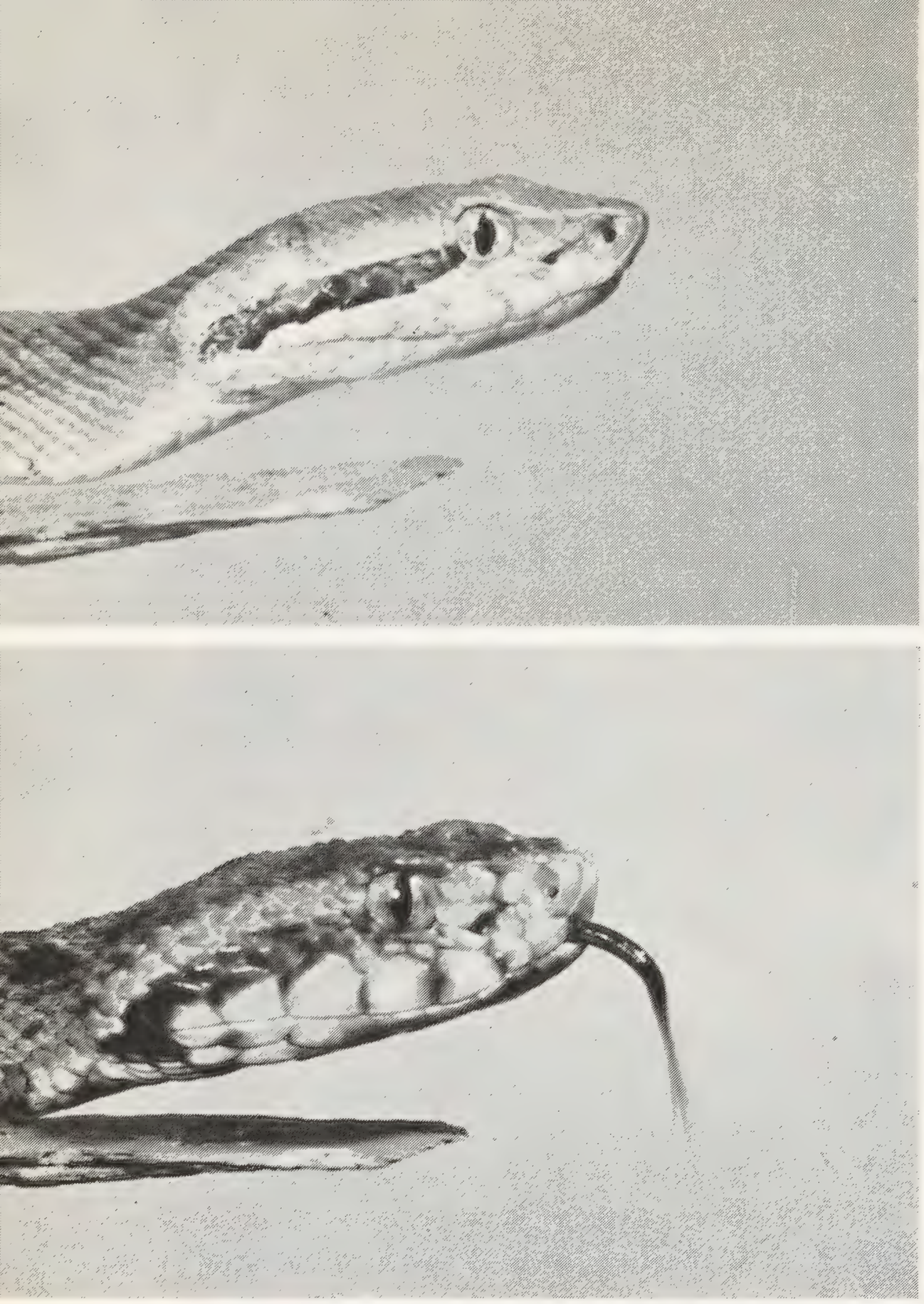
My first day on Martinique brought an unexpected problem. The only island contact that I had was the name of a Catholic priest, Père Pinchon, who was a well-known local naturalist. He was reputed to have kept Fer-de-Lances in his quarters — and had been bitten by one a couple of years ago. However, a telephone call to the "Séminaire-Collège" revealed that the good Père was visiting another island and that he would not return until after my departure. Further, the Fort-de-France zoo, another possible contact, had been destroyed by a hurricane some years ago and had never been replaced.

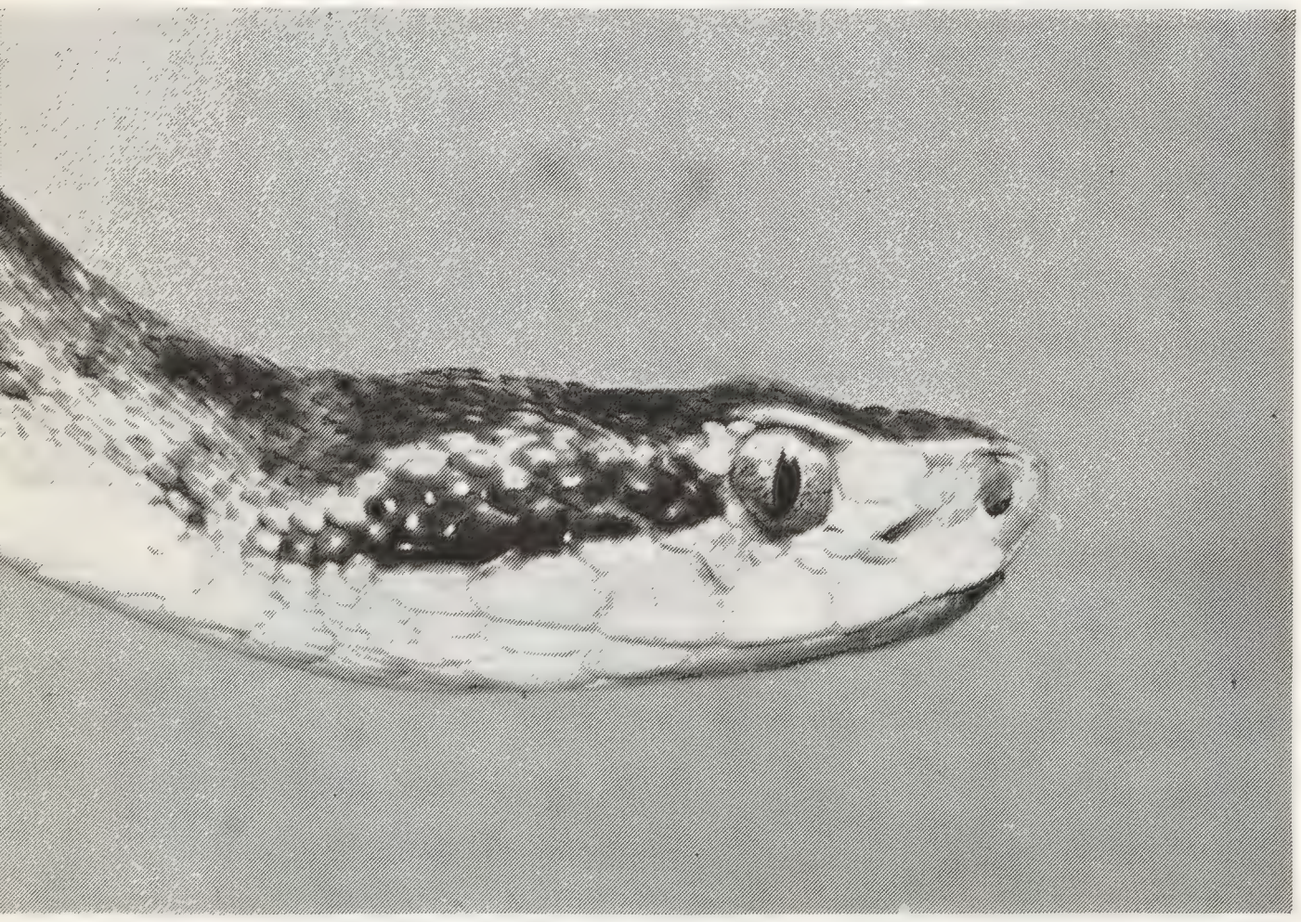
Fortunately, in leafing through the telephone directory I had noted a familiar name, the Institut Pasteur. This well-known bearer of the even more famous name manufactures antivenins for the treatment of snakebite in Europe, Africa and Asia. What more logical place was there to find out about venomous reptiles?

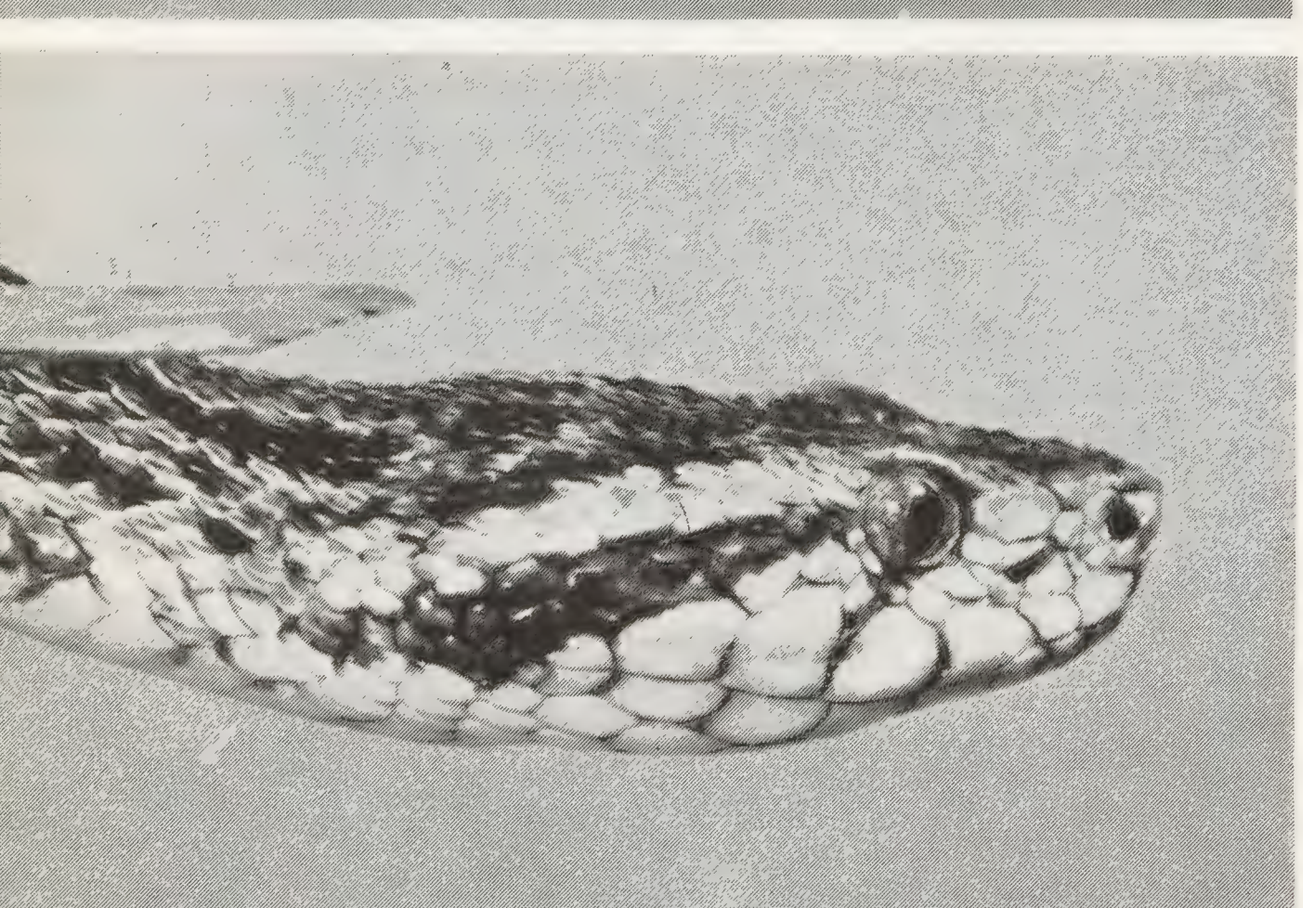
Dr. Roger Mille, the Director of the Martinique Institute, greeted me warmly, then explained in his broken English (unfortunately, I do not know enough French to fracture it) that he, too, was interested in obtaining Fer-de-Lances but that he had had no success. Further discussion revealed that Dr. Mille was concerned because the Brazilian antivenin, used for Fer-de-Lance bites, was not effective. He wanted to collect some of the local snakes for laboratory tests and perhaps for the production of a special antivenin, but had not been successful.

I was amazed to hear that neither the Institut Pasteur nor the French government had produced an antidote for this main scourge of Martinique's population in 300 years of habitation. However, I was *not* surprised that the Brazilian antivenin was ineffective, being convinced that the snake whose bites it was prepared for was quite a different species!

I explained this to Dr. Mille and promised to cooperate by having the venom assayed in the United States if I were fortunate enough to obtain living snakes. Dr. Mille gave me the name of André Forestal, mayor of the small town of Grande-Rivière on the northern coast of the island. He said that Mayor Forestal could produce a *serpent* if anyone could.







M. Forestal was somewhat amused by the strange American that appeared at his door and was shocked by my request that live Fer-de-Lances be produced – and within a week! Nevertheless, he undertook to do all he could and immediately alerted his town to my unusual desires. After spending five frustrating days criss-crossing Martinique in a rented car without finding a trace of Fer-de-Lance (*Animal Kingdom:* 67(6)), I proceeded to St. Lucia.

St. Lucia was far different. I met Mr. Harry Adkinson, manager of the Marquis Estate, the first day and he offered to "loan" me a helper who was not afraid of snakes. Mr. Adkinson said that the *serpent* (as it is called) did occur on the estate but that he had had a bounty on them for some years and they were much fewer than they had been originally. He predicted that it would be hard work to find them.

His prediction was all too true. When I arrived at the estate the next morning I found Eugene Arnold, my stalwart helper, waiting with his machete and a long forked stick. Since he was better acquainted with the habits of the *serpent* than I, I let him lead the way.

It was fortunate that I did so, because this was a new kind of snake-hunting to me. The method consisted of selecting a pile of coconut hulls (the thick fibrous covering of the nut) of the right age – not too recent, not so old as to have lost its resilience – and to sift through the entire pile. Since most of the piles were ten to twelve feet in diameter and five feet high, it took a long time to pick off the hulls one by one (really quarter by quarter).

I had about lost hope by noon, and the fifth pile, when Eugene broke the sound of falling husks to say calmly, "Help me." It was such a quiet request that I did not realize for a moment

The tangled serpents: Although they have a general similarity, living individuals show differences in head shape, scales and color patterns. Note especially the width and direction of the dark stripe that extends behind the eye.

Top to bottom: Fer-de-Lance,* Bothrops lanceolatus, *from Martinique.
Jararaca,* Bothrops jajaraca, *from Brazil.
***St. Lucia Serpent,* Bothrops caribbaeus.**
Barba Amarilla,* Bothrops atrox, *from Trinidad.

that he had a large *serpent* pinned down with his stick. Putting my stick on its head, I forked it in the flour sack brought along for that purpose. I attacked the next pile of coconut husks with considerably more vigor but though we worked equally hard for the rest of the afternoon, we had no further success.

The following day was the same – digging through coconut hulls all morning, a single *serpent* at about noon, and nothing the rest of the day. Mr. Adkinson suggested that we try the adjacent "Grande Anse" plantation the next day. It had not posted a bounty and the *serpent* was said to be common.

And common they were! The first pile revealed a snake, none in the second, third, or fourth – but the fifth had two! By three in the afternoon Eugene and I had nine *serpents*. My sacks were full and we could call it a day.

The next morning I shipped the eleven St. Lucia serpents to the Zoological Park and emplaned for a second trip to Martinique. A telephone call brought the bad news that M. Forestal still had located no Fer-de-Lance. I had lost confidence that I could find any myself and prepared to leave the islands without a single Martinique specimen.

On the afternoon of my last day on Martinique I dropped in on M. Forestal's Fort-de-France office for a farewell visit. He met me at the door, his eyes gleaming. His *secrétaire,* M. Leopoldie, had a live *serpent* for me in Grand-Rivière! Grand-Rivière was thirty miles away – twenty of them on the murderous hairpin curves of the northern mountains. There was nothing else to do, though, so off I went in my rented car.

M. Leopoldie met me at the *Mairie* of Grand-Rivière. With him was the snake-catcher, Ernest Darroux, a Dominican by birth, who appeared to be the only man in town who was not afraid of the *serpent*. He had an old rusty can by his side and, with the townspeople gathered at a discreet distance, I pried off the top to see my first live Martiniquan Fer-de-Lance. Small but lively, it appeared to be in good health and I gave M. Darroux my thanks and congratulations. He explained that the *serpent* was seldom seen at this time of year (the hot season) but that he killed many of them at other times. Perhaps if I could come back in December or January, he could get several. This did not seem possible but the following morning I boarded the plane to New York in a much happier frame of mind than I had anticipated.

These living specimens, together with another 34 young born to the St. Lucia individual first caught by Eugene and me, plainly show the differences between the Martinique Fer-de-Lance, the St. Lucia Serpent and the mainland *Bothrops atrox* which, I suppose should take the common name of "Barba Amarilla." But we still do not know how these reptiles are related nor how their strange distribution in the West Indies came about.

The St. Lucia Serpent, *Bothrops caribbaeus,* appears to be closely related to the mainland Barba Amarilla (*Bothrops atrox*). The Martinique Fer-de-Lance (the term Fer-de-Lance was coined for this snake by its original describer, M. Lacépède), *Bothrops lanceolatus,* however, does not resemble the common mainland form, but appears closer to a Brazilian species, the Jararaca (*Bothrops jajaraca*).

But perhaps both of these snakes have closer, but unrecognized, relatives on the adjacent South American coast. The huge delta of the Orinoco might be a good place to look for such relatives since its flood-waters often take veritable floating islands, often populated with animals, out to sea – to drift ultimately to the shores of the Lesser Antilles.

Or could it just possibly be that at some time in the dim corridors of pre-history a raiding party of Caribs *did* toss baskets of Fer-de-Lances on Martinique? And a lost boat of that same raiding party, bearing too far to the south, accidentally and mistakenly released the ancestor of *Bothrops caribbaeus* on St. Lucia? We cannot say.

SELECTED BIBLIOGRAPHY

AMARAL, A. 1954. Contribuição ao conhecimento dos ofidios neotrópicos XXXV. A propósito de revalidação de *Coluber lanceolatus* Lacepede, 1789. *Mem. Inst. Butantan,* 26: 207-214.

HOGE, A. R. 1952. Notas erpetólogicas. Revalidação de *Bothrops lanceolata* (Lacepede). *Mem. Inst. Butantan,* 24 (2): 231-236.

LALUNG, H. DE 1934. Le Serpent de la Martinique. Paris: Laboratoires Corbière, 78 pp.

LAZELL, J. D., JR. 1964. The lesser antillean representatives of *Bothrops* and *Constrictor*. *Bull. Mus. Comp. Zool.,* 132 (3): 245-273.

ROUSE, I. 1964. Prehistory of the West Indies. *Science,* 144: 499-513.

RUFZ, E. 1859. Enquête sur le Serpent de la Martinique. 2nd ed. Paris: Germer Baillière, xix + 389 pp.

TYLER, R. E. 1849. Notes on the serpents of St. Lucia. *Proc. Zool. Soc. London:* 100-104.

VELLARD, J. 1928. Importance des caractères fournis par l'hemipenis pour la classification des ophidiens. *Bull. Soc. Zool. France,* 53: 406-418.

A Naturalist Spies on

THE SILKY-FLYCATCHER

By ALEXANDER F. SKUTCH

San Isidro del General, Costa Rica

NEARLY THIRTY YEARS AGO, before the paved highway was extended to the 11,412-ft. summit of Irazú in Costa Rica, I was riding a horse down the southern face of the then inactive volcano when a flock of starling-sized birds flew across the road and settled in the top of an oak tree. Through my field glasses I scrutinized their slender gray forms, with high peaked crests, yellow under tail-coverts, black tails with white in the middle of the outer feathers and two projecting central feathers. Already familiar with the Gray Silky-Flycatcher of the highlands of Guatemala and Mexico, I promptly recognized these graceful birds as my first examples of the more ornate southern species, the Long-tailed Silky-Flycatcher.[1]

For many years I had wished to study these little-known birds without close relations. In the high mountains of western Guatemala in the 1930s, I often saw Gray Silky-Flycatchers but searched in vain for a breeding pair. In later years, other ornithologists have found nests and eggs in Mexico, but no detailed study of its habits has been published. During many seasons in Costa Rica, I watched nesting birds at altitudes too low for silky-flycatchers; even the wild moun-

[1]The genus *Ptilogonys* contains only these two species, *cinereus* in the northern and *caudatus* in the southern highlands of Central America. Likewise confined to these southern highlands is the little-known Black-and-Yellow Silky-Flycatcher, the sole representative of the genus *Phainoptila.* With the Phainopeplas of southwestern United States and Mexico, these birds make up the silky-flycatcher family (Ptilogonatidae), which accordingly contains only three genera and four species. Some ornithologists merge this small group with the waxwings of North America and Eurasia.

tains where I studied the Quetzal were not high enough for these gray wanderers of the cool heights. Finally, in 1963, I passed the nesting season at "La Giralda," a large dairy farm near the western end of the massif of the Volcán Barba, the next height to the west of Irazú in Costa Rica's Cordillera Central. Fortunately, I had chosen this locality after considering one on Irazú, where my work would have been abruptly terminated by the eruption which began in March and which destroyed the farm. At La Giralda there were only light falls of ash.

Long-tailed Silky-Flycatchers rarely descend below 6,000 feet, but at La Giralda they were abundant between 6,500 and 7,500 feet, where I found them chiefly in pastures with scattered trees. I had not been long among them before I noticed a number of peculiar traits of character which distinguish them from every other bird that I know, save only the Gray Silky-Flycatcher. As is to be expected of relations of the Cedar Waxwing, silky-flycatchers are gregarious birds, although their flocks are smaller and less compact than those of the waxwing. The silky-flycatcher's life seems to be a continual compromise between social and individualistic impulses. When resting, the members of a flock often distribute themselves among neighboring trees, where they perch by preference on the topmost exposed twigs, appearing elegantly tall and slender with their upright stance, high crest and long tail, and presenting an unmistakable profile against the sky. When the flock moves, they straggle along, one or a few at a time, and frequently birds

In this shady pasture at an altitude of 7,500 feet the silky-flycatchers foraged and nested. They prefer open, cool heights.

Nests are not easily seen amid the pale gray beard-lichen used in their construction. Six feet up, this was the lowest of all.

which set forth together veer apart in flight, some perhaps returning to their starting point while others fly away in different directions. Rarely did I find more than a dozen silky-flycatchers in one of these loose aggregations, but once I counted at least 16 in the top of a tall alder tree. At nightfall, as they seek their roost, they form more compact flocks.

Silky-flycatchers love the open spaces of cool mountain heights. They rest at the summits of the tallest trees and fly above their tops, whether their course takes them over the pastures or above the heavy forest of massive, epiphyte-burdened oaks, into whose shady depths they rarely penetrate. Flapping their wings intermittently, they rise and fall in long undulations. Often at the same time they veer from side to side, as though unable to make up their minds where to go. Restless birds, they range widely over the mountains, covering many miles each day.

Although almost songless, silky-flycatchers are noisy, loquacious birds. The most common utterance of the long-tailed species is a sharp, dry *che chip, che chip*. This note is given in flight as well as while perching. It serves primarily to hold the flock together, but with slight modification it is repeated incessantly by parents apprehensive for the safety of their young. Rarely I heard a male, perching in the sunshine on a high, exposed twig while his mate incubated nearby, sing with low lisping notes.

Silky-flycatchers eat large quantities of both insects and small fruits. Of the latter, they are fond of the pea-sized, orange berries of a species of *Citharexylum*, a tree of the verbena family. With their small, weak bills, they sometimes have difficulty plucking these berries, even those which appear to be ripe. The black berries of the arborescent fuchsia and orange berries of mistletoes are also eaten. Insects of various kinds are caught in the air, often on long sallies from a high lookout.

On April 1, before the dry season ended, I found my first silky-flycatcher's nest. No others were noticed until after the middle of the month, when rains were frequent and the mountain was often shrouded in cold cloud-mist. The last of the 18 nests that I discovered still held nestlings in early July. Thus the silky-flycatchers, like most of their feathered neighbors, bred in the early part of the long rainy season, when, despite inclement weather, insects were abundant and plants that had flowered during the drier months were yielding berries. The breeding pairs were not uniformly distributed over the hundreds of acres of mountain pastures where scattered trees offered sites for their nests, but were grouped in small, widely scattered colonies, each containing from two to four nests. The closest nests were only 65 feet apart, but more often those of a colony were separated by 150 to 225 feet. Each pair defended a poorly defined area extending around its nest site for a distance of about 75 to 100 feet. Both members of the resident pair flew at trespassers of either sex, who always retreated without resistance, so that clashes between them were never seen. When nests were unusually close together, one of them might be screened by dense foliage, so that its attendants could come and go without attracting the attention of their nearest neighbors.

Silky-flycatcher nest sites thousands of feet above Costa Rica's central plateau (middle distance). One pair nested at the right of the leafy tree in center and another at the left side of nearest dying tree.

In height, the nests which I found ranged from 6 to about 60 feet, but the majority were from 10 to 20 feet above the ground. The male silky-flycatcher worked as hard at building the nest as his mate did. The chief constituent of all the nests was a profusely branched, pale gray beard-lichen (*Usnea*) that grew abundantly on almost every tree of these cloud-bathed heights. This material, like everything else that went into the nests, was pulled directly from the trees rather than picked up from the ground, on which silky-flycatchers seem never voluntarily to alight. To pluck these lichens was no easy task for these weak-billed birds, who often, after tugging valiantly at them, were content to fly to their nest with a scarcely visible fragment in their bills. Minor ingredients of the structure were small twigs and pieces of dry inflorescences, foliose lichens, and cobweb or caterpillar's silk, which was freely used to bind the lichens together.

Each partner arranged in the nest whatever it brought, scarcely ever passing its contribution

to its mate when it found the latter sitting there shaping the structure, as some birds habitually do. To convert the bushy lichens into a dense, felt-like mass required much vigorous work, which seemed to be done chiefly with the feet, invisible to a watcher on the ground. In considerably less than a week, the two builders completed one of the most beautiful and unusual birds' nests that I know. The hundreds of pieces of lichen which they had laboriously gathered were compacted into a firm, thick, resilient fabric, in form a broad, open cup. Unlike most nests, this structure had no special lining, but the inner surface was composed wholly of the same lichen that made up its bulk. Pieces of gray foliaceous lichens were more or less liberally attached to the outside, as in many hummingbirds' nests.

The silky-flycatchers' nests were often placed where there was little or no foliage to conceal them, sometimes on dead branches. But they were usually situated amid a profuse growth of the beard-lichen of which they were composed, which often hung in long streamers around them. Thus they blended so well with their setting that they were easily overlooked, although the practiced eye could often pick them out by their solidity. Certainly the White-tipped Brown Jays, which preyed on the eggs and young, seemed to have little difficulty finding them.

Two or three days after the nest was finished, the female laid her first egg, early in the morning. The second egg was deposited considerably later on the following morning. In no case did I find more than two eggs, whose pale gray ground color, almost matching that of the lichens on which they rested, was blotched and spotted with shades of dark brown and pale lilac. The male, who had often sat in the nest to build it, no longer entered it, leaving the task of incubation to the female alone. Although she was often a restless sitter, leaving her nest from 15 to 45 times in the course of a day, usually she hurried back after a brief recess, so that she achieved a constancy remarkably high for so small a bird. Five females, each of whom I watched for an entire day, were on their eggs for 81 to 87 per cent. of their active period of 10 to 11 hours, counting from their first departure in the morning until their last return in the evening.

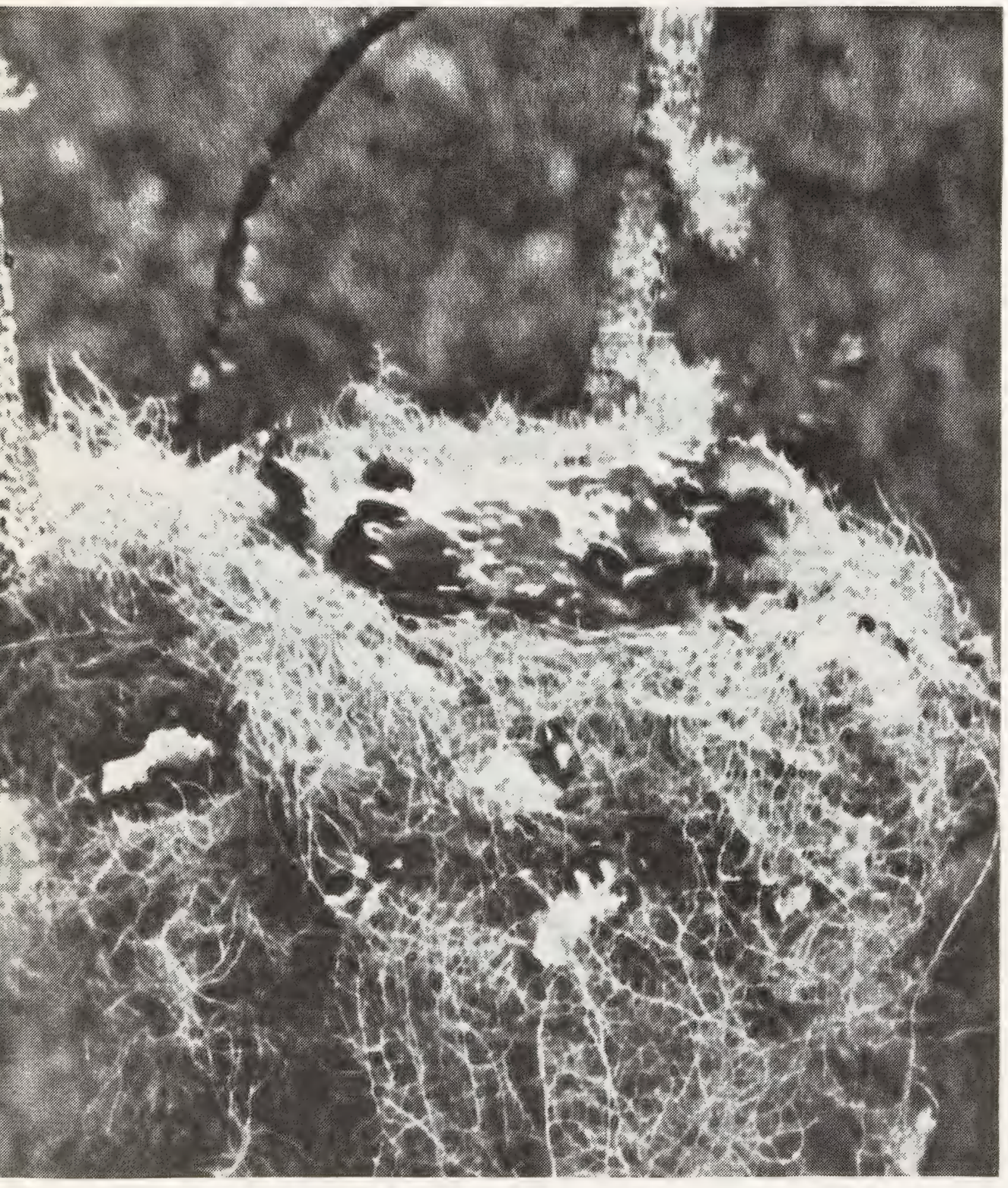
During the days when the nest was being built, the male often fed his mate, usually in the intervals when the pair rested from their toil, but

sometimes while they were actively building. One female arriving with material for her nest appeared to swallow it, in order to take the food which her partner presented to her. This nuptial feeding continued throughout the period of egg-laying and incubation. One male fed his incubating mate at least thirteen times in the course of a day, but at the latest nests the sitting female received little or nothing from her partner, whose zeal seemed to wane as the breeding season drew to a close. There was little correlation between the number of feedings by the male and the female's constancy in incubation, whence we may infer that, in any case, the incubating female gathered the greater part of her food on her frequent, brief excursions from the nest.

After 16 or 17 days of incubation, the eggs hatched, releasing nestlings as unique in appearance as the nest in which they lay. They bore short, compact tufts of whitish down, arranged in narrow rows which left large areas of blackish skin exposed. By breaking the nestling's surface into irregular areas, these lines of down made it more difficult to detect in the open nest. The interior of the nestling's mouth was flesh-colored centrally, with a band of orange around the edges, and the flanges projecting from its corners were yellow. These nestlings developed slowly, and were about two weeks old before the upper surface of their bodies was fairly well covered with the expanding plumage, at least when their wings were folded. Their flight feathers grew even more slowly, and at the age of 18 days they could not fly. Two sets of nestlings that I carefully watched remained in their nests for the unexpectedly long period of 24 or 25 days. At this age they resembled their mother, but their crests were rudimentary and their tails still stubby.

The nestlings were brooded only by their mother, who ceased to cover them on clear mornings when they were about two weeks old, although she continued until they left the nest to

The new gray plumage of the 18-day-old birds is sprinkled with persistent tufts of natal down. Beard-lichen covers the stump.



Still unable to fly at the age of 18 days, these young silky-flycatchers almost fill their nest of the branched beard-lichen.

shield them from rain, which was frequent at this season. Both parents fed the young, at first almost wholly with insects caught on the wing, but with increasing quantities of berries as the days passed. Usually a number of items were brought at one time, held in the mouth and throat as well as the bill, and delivered to the nestlings in installments. As many as seven berries might be brought at once. During the nestlings' first days, when some females brooded them continuously for long intervals, the male parent might perch in a neighboring tree, with mystifying skill catching insects in a mouth from which they already overflowed, and holding his collection for seemingly interminable periods. When finally the mother left, and often not until she returned to feed the nestlings and resume brooding, he at last flew up to give the young a large meal. Other males would approach the brooding female with a billful of food, pass part of it to her, then, when she rose up to

feed the young beneath her, deliver the remainder directly to them. In 20 hours of watching, distributed throughout the nestling period, one male brought food 141 times, his mate 110 times. Even after the female ceased to brood, he fed the nestlings more often than she. All the nestlings' droppings were swallowed by the parents, and, aside from an empty shell, I never saw any waste carried from the nest in a parent's bill.

For all their profuse vegetation, the high mountains where Long-tailed Silky-Flycatchers dwell have a climate which is often rigorous and difficult for people not hardened to it. For days together, strong gales sweep over these heights, driving the cloud-mist through the trees and into houses that are not tightly closed. Rains are cold and often hard. Frost whitens open fields on clear, calm nights of the northern winter. These things seem not to trouble the hardy gray wanderers of the mountain-tops. They persist in resting on high, exposed perches while boisterous wind ruffles their plumage and twists their tails. Here they stay while the chilling gray clouds drift through the trees, dimming their thin forms until they appear unsubstantial and ghost-like—until, seeming to dissolve in the mist, they vanish. Then only their sharp *che chip* betrays their continuing presence. They faithfully attend their eggs and young even in the rudest weather. One day, while I watched an incubating female, a storm blew up soon after noon. The rain was driven by a northerly wind so violent that, in a sudden reverse gust, it blew my umbrella inside out. Thunder rolled heavily in the distance. The silky-flycatcher sat in her nest almost transversely to the wind's prevailing direction, presenting her long tail edgewise to its fury. She was pressed against the leeward side of the cup and was evidently clinging to the bottom with her feet to prevent being blown away. After she had sat continuously for two and a quarter hours — the longest diurnal session that I had seen any silky-flycatcher take — the wind abated temporarily and she left her eggs exposed for six minutes while she sought food. When she returned as the gale increased again, I saw that the wind had bent the ends of her long central tail feathers to the right — a curvature which persisted until the following day. Competent to confront the harshest weather of tropical mountains a mile or two high, silky-flycatchers are intolerant of the lowland's heat.

News from the Conservation Foundation

Habitats Conference

In 1955 the Wenner-Gren Foundation sponsored "Man's Role in Changing the Face of the Earth." An equally significant study conference with many new participants will be held at Airlie House, Virginia, from April 6 to 10 of the present year, under sponsorship of The Conservation Foundation. The subject will be "The Future Environments of North America." The object is to develop methods of conserving habitats in a populous, mechanized environmental revolution.

Study sessions will be devoted to:

I. The Organic World and Its Environment
II. Regions: Their Developmental History and Future
III. Economic Patterns and Processes
IV. Social and Cultural Purposes
V. Regional Planning and Development
VI. Organization and Implementation

The conference will be summarized by Lewis Mumford.

Some forty papers have been submitted by outstanding scientists of varying disciplines concerned with wildlife preservation and management on a continent being overrun by man. The steering committee consists of F. Fraser Darling, Chairman; Ian McTaggart Cowan, A. Starker Leopold, Lewis Mumford, Max Nicholson and Christopher Tunnard, with John Milton of The Foundation as secretary. Doubleday & Co. will publish the papers in book form, and also a paperback summary.

Environmental Science Series

An agreement has been reached between The Foundation and the Natural History Press of Doubleday & Company to co-sponsor a series of ten or more educational books by authorities in the key areas of The Foundation's interest. Well-known writers in these areas are now being approached to prepare the volumes, and The Foundation's staff will assist in both editorial and authenticating work. The average length of each book will be 40,000 to 50,000 words.

The series is designed to appeal primarily to the young audience at the junior high school level, but the subject matter and style will also be suitable for supplementary reading at the high school level and by the general lay audience. The books will be issued in paperback form, with their own distinctive colophon and art treatment.

This project, supervised by Paul Brandwein, Director of Education for The Foundation and Co-Director of the Pinchot Institute for Conservation Studies, is expected to be well under way in 1965.

Briefly Noted

Edward H. Graham, author of "Natural Principles of Land Use," recently retired as ecologist in the United States Department of Agriculture and is now devoting his time to consulting work. The Foundation is pleased that Dr. Graham has agreed to attend twelve staff meetings and advise on projects and policies, beginning January 26 . . . Clifford Emanuelson, formerly Director of Field Operations of the Open Space Action Committee, has accepted the post of Associate Director of the Pinchot Institute beginning in April . . . Representing The Foundation at the AAAS annual meeting in Montreal were Dr. William Vogt and John Milton . . . Frank Fraser Darling and Noel Eichhorn will complete the last stage of their field study on "Man and Nature in the National Parks" in Hawaii Volcanoes National Park, the Haleakala National Park and the island of Kauai during February. Work on the final report has already begun . . . William Vogt was the keynote speaker at the "Winds of Change Seminar" on population at Michigan State University on February 5. His topic was "It's People That Count." . . . Martha Munzer is writing her new book for Knopf, entitled "Pockets of Hope," aimed at a teen-age audience and dealing with the economically distressed areas of the nation and possibilities of relief . . . Newsletter #12, "Ecology: Lesson for Today," has been distributed to the 6,000 teacher-subscribers.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Staff Appointments Made At Aquarium and Zoo

Six staff appointments at the New York Aquarium and the Zoological Park were announced at the end of January by President Osborn, following the meeting of the Executive Committee of the Society's Trustees on January 27.

Paul Montreuil, Curator of the Aquarium since 1963 and Acting Director since last October, was named Director. He came to the Aquarium from the Quebec Aquarium, where he had been Curator for three years. Previously he had been Director of the Marine Biological Laboratory in the Magdalen Islands of the St. Lawrence, with several years of experience as Biologist of the Magdalen Islands station.

Christopher W. Coates, Director of the Aquarium since 1956, has retired and is now Director Emeritus and Consultant.

Dr. Carleton Ray, Associate Curator of the Aquarium since 1961, was made Curator. Dr. Joseph R. Geraci, VMD, formerly a research associate in pharmacology in the Aquarium's Department of Marine Biochemistry and Ecology, was made Associate Curator. Dr. Geraci was graduated from the University of Pennsylvania in 1963 and for a year was an assistant instructor in the University's School of Veterinary Medicine.

At the Zoological Park, Herbert J. Knobloch, Associate Curator of Education since 1957, was given the rank of Curator of Education, and John McKew, Personnel Manager since 1961, was given the additional title of Assistant to the Director.

At an earlier meeting of the Executive Committee, Dr. Michael Emsley was appointed Assistant Director of the Society's Department of Tropical Research. He took up his duties at the Tropical Research Station at Simla, in the Arima Valley of Trinidad, on January 1, and has living quarters on the Station's property.

A Game Warden Writes of the Versatile Elephant

Close observation of what animals do is part of the job of a Game Warden in Africa, as elsewhere, and occasionally the Zoological Society gets reports or letters from wardens which present brief vignettes of the lives of their charges. Such a letter came recently from John Savidge, a Game Warden of the Ruaha National Park in Tanzania — a new park to which the Zoological Society through its African Wildlife Fund contributed more than half of the organizing budget.

"What habitat-modifiers are elephants!" Mr. Savidge wrote. "Surpassed only by man himself, who wins principally because of his fire and machinery. The elephants here are bulldozers, ploughs, tree-fellers, water-borers, path-makers and dung-distributors. Without them the wilderness would look a different place indeed. And so many animals, birds and insects are indirectly dependent on them for water supplies.

"We watched a herd scuffing out the sand of the dry watercourse near the camp here in the heat of the day. The sand was so hot that a mere human could not have endured to stand there, but the elephants spent a lazy three-quarters of an hour at their digging.

"They begin with the toes of the forefeet, where we would use the heel, then use the trunk when the hole gets deeper. Before the muscles of the trunk develop, the little calves drink water with the mouth direct, but not from these sand-holes, which their clumsy efforts would fill in. They become bored with the proceedings and roll in the shade of the adults — the excavated sand is damp and cool.

"Immediately the elephants leave, a troop of baboons (that have been collecting on a fallen tree nearby, arms on knees and studied disinterest on every long face), drop down and rush across the white-hot sand to drink, heads and shoulders hidden in the ready-made holes.

"The same afternoon a group of five grey kudu cows cross the dry river bed and water there. Later there is the hum of honey-bees, amplified in the trunk-shaped tunnels. The dry surface-sand grains cascade and fill the funnel-shaped hollows. Water stored below the sand keeps cooler and cleaner, and evaporates less than water exposed. Elephants prefer it to water taken from a running river, as I have seen many times near the Nile."

IN BRIEF

Membership Record. At the end of 1964 Membership in the Zoological Society was at its highest since the foundation in 1895, with 5,127 Members of all classes. New Members during the year totalled 982.

The Tiny Talapoins. Smallest of all the African monkeys collectively known as guenons is the Talapoin (*Cercopithecus talapoin*). Late in January we acquired our first specimens, a male and two females. They will go on exhibition later in the winter after routine checking in the Animal Hospital.

Home-grown Sponges. Colonies of the Red Beard Sponge, *Microciona prolifera,* from local waters, have been introduced into two systems at the Aquarium and are growing well, thereby providing fresh sponge material during the winter months when the open-water population is killed back or degenerates because of the drop in water temperature.

Quetzal Longevity. What appears to be a record longevity for the species has been established by a female Costa Rican Quetzal, *Pharomachrus mocinno costaricensis,* which came to the Zoological Park on October 9, 1942, and was euthanized on December 19, 1964. It lived in the collection 22 years, 2 months and 10 days.

Not Everybody Likes Television. For several weeks the Mammal Department has experimented with television as a device for relieving what appears to be boredom among some of the anthropoid apes. It is not an unqualified success. Four young Orang-utans are almost completely indifferent to it, although one of them occasionally watches for a minute or two. Andy, the large Orang-utan, was terrified by it and rushed to the back of his compartment when a portable set was installed in the passage immediately in front of

So many Members turned out for the Zoological Society's meeting in the New York Hilton on the night of Jan. 12 that even the Hilton ballroom — the largest one available — proved to be inadequate. It is possible that next year the Society will have to return to meetings on two nights.

These tame young Mona Monkeys from Africa will go on exhibition this spring in the Monkey House. If they stay as active as they now are, they will add much to the gaiety of the show.

him. Only Pili-pili, the young male Mountain Gorilla, showed definite signs of interest. Several times he was seen watching the moving images for long periods, which generally ended with a rush in the direction of his female companion, Sumaili, and an attempt to strike her. One clout over the head, and Pili-pili was usually satisfied and returned to watching the program. Since television has no interest for the young Orangs, an old rubber tire and a few other toys have been introduced into their compartment. Frequent feeding in small amounts seems to be the best way of stimulating them during the winter months when visitors are few.

Good Zoo Attendance. After a slow start in the spring and an indifferent summer, attendance at the Zoological Park increased heavily during the fall and at the end of the year the total was 2,308,112 visitors, a figure nearly 200,000 above the ten-year average.

Channel 13 Party. Slightly more than a thousand adults and children — members of families which contribute to Channel 13, the educational television station — were guests of the Zoological Society at three identical parties in the Lion House on December 28, 29 and 30. They saw half an hour of animal movies each day, plus demonstrations of a variety of small animals.

More Zoo Babies. The birth rate in the mammal collection, which has been steadily increasing for several years, reached a peak in 1964 when 130 births were recorded, as against 97 in the previous year. Among them were Chevrotains, Gemsbok, Blesbok and a Wisent. The Bird Department had an equally good year. Only a fraction of the 1,200 eggs that were collected by mid-July were incubated, but they produced valuable birds, including Inca Terns, Wood Ducks, Mandarin Ducks, Chestnut-breasted Teal, Chilean Widgeon, European Shelducks and Graylag and Bar-headed Geese. An excellent start was made in 1965 when two Gouldian Finches were hatched and a Wattled Crane began incubating in the Ostrich House.

PUBLICATIONS OF INTEREST

RARE AND EXOTIC BIRDS. By Robert Cushman Murphy. Color photographs by Arthur Singer. 46 pp., profusely illustrated. The Odyssey Press, New York, 1964. .95 cents.

This small volume of bird photographs in color will be of particular interest to Members and friends of the Zoological Society, for more than half of the 73 photographs were made in the Zoological Park and many of the birds pictured are familiar old favorites — "Herbie," the cassowary; the Harpy Eagle, the Congo Peacock. The smoothly-flowing text by Dr. Murphy brings together many facts and beliefs about birds. — J. B.

THE LAND AND WILDLIFE OF NORTH AMERICA. By Peter Farb and the Editors of *Life*. 200 pp., profusely illustrated in black-and-white and color. Life Nature Library: Time, Inc., New York, 1964. $3.75.

North America is likely to be more familiar to us (at least in spots) than most of the other areas treated in the Life Nature Library; nevertheless, this volume does not suffer by comparison. The text is substantial and the photographs superb.

THE WORLD OF THE RACCOON. Text and photographs by Leonard Lee Rue III. 144 pp., 106 illus. Lippincott Co., Philadelphia, 1964. $4.95.

Years of observing and photographing Raccoons obviously went into the making of this latest of Mr. Rue's books for the series entitled "The World of the....." Here is just about all the general reader will want to know about Raccoons.

THE SIGN OF THE FLYING GOOSE. A Guide to the National Wildlife Refuges. By George Laycock. 299 pp., maps, photographs. The Natural History Press: American Museum of Natural History, New York, 1965. $5.95.

The flying goose of the title is, of course, the sign of the 280 National Wildlife Refuges in this country. Mr. Laycock discusses 17 of them in chapter detail and gives pertinent data about 145 others, as well as recounting how the refuge system came into being (paying warm tribute to J. Clark Salyer II along the way). He takes a look at the future, and foresees more hazards for wildlife than ever in the past.

BUMBLE: PIG IN PARADISE. By Elma M. Williams. 192 pp., photographs. John Day Co., New York, 1965. $4.50.

THE LOON IN MY BATHTUB. By Ronald Rood. 176 pp., photographs. Stephen Greene Press, Brattleboro, Vt., 1964. $4.50.

Bumble was a tiny piglet with an injured foot when Elma Williams adopted her and added her to the menagerie of domestic animal friends at her cottage-and-forty-acres in Wales. This is a sentimental account of life among a helter-skelter collection of pets. Mr. Rood's chronicle of adventures with animals, on trips and at home and as a teacher, is a good deal wider in scope, but a bit on the thin side.

New Members of the New York Zoological Society

(Between November 1 and December 31, 1964)

Founder-in-Perpetuity

Alfred Gwynne Vanderbilt

Founder

Charles W. Nichols, Jr.

Associate Founder

Peter Gimbel

Patron

H. O. H. Frelinghuysen

Life

Mrs. Hayden Smith

Supporting

Mrs. George E. Brewer, Jr.
John Dean DeRienzo
Carl Holmes
Mrs. Kenneth A. Ives
Mrs. William R. Kirkland, Jr.
Mrs. Otto Marx
Irving L. Straus
Mrs. H. Clinch Tate

Contributing

Edwin C. Andrews, Jr.
Mrs. Henry A. Barton
Mrs. Howard S. Benedict
Siegfried Bieber
Mrs. Robert E. Blum
Mrs. Charles F. Brush
Kershaw Burbank
Mrs. Barbara Charlon
James S. Church
Harold T. Clark
Dr. Edward R. Clemmens
Pom Collins
Mrs. Charles D. Dickey
Miss Patricia DuPont
Mrs. Albert Francke, Jr.
Wilfred Funk
Langdon S. Goddard
Dr. Harold S. Goldman
Mrs. Lafayette A. Goldstone
John C. Gorman
Albert N. Guthrie
Sinclair Hatch
Mrs. Alfred J. Harding
Mrs. Howell Howard
Mrs. M. Immermann
Mrs. J. Burr Jenkins
Miss Olwen M. Jones
Mrs. John W. Keeler
Mrs. Edgar G. Lansbury
Mrs. Hobart Lewis
Otto Martin Locke
Donald MacCampbell
Mrs. Sally Mason
Miss Carmen Mathews
George R. Nave
Albert Nerken
William L. Newton, Jr.
George Nobbe, Jr.
W. Josiah Norton
David C. Prince
Mrs. George A. Rentschler
Charles P. Ridgway
Daniel Rose
Lawrence M. Rosenthal
Richard Roth
Clendenin J. Ryan
Dr. Walter S. Schachat
Herbert L. Seegal
Mrs. C. D. Seymour
Mrs. Jeffrey Shannon
Mrs. F. P. Shepard
Mrs. Daniel Steiner
Mrs. Mary Stolz
George W. Sumers
Miss Katie B. Viar
Miss Norma Terris Wagner
Dr. Harry Wallerstein
Robert M. Webb
Fifield Workum

Annual

Miss Freda K. Abel
Dr. Bernard L. Albert
Bernard Altshuler
Miss Martha Amort
Boudinot P. Atterbury
Mrs. Edward Auchincloss
Hugh H. Babcock
Miss Hildegarde D. Becher
Mrs. Charles Bechtold, Jr.
Miss Madeline L. Beisler
H. Kennedy Bell, Jr.
Dr. Robert Bruce Bergmann
Murray L. Berrie
Dr. Robert W. Bertcher
Mrs. Morris G. Bishop
Mrs. Louis G. Bissell
Conway Blackford
Mrs. Ray S. Blakeman
Mrs. Marie J. Blechner
David S. Block
Mrs. Edward E. Booher
Dr. Robert M. Bookchin
Mrs. Beatrice Boone
Alan M. Borden
Donald G. Borg
Mrs. James W. Brett
Charles Brickner
Charles Raymond Brodix
Mrs. Harris H. Bucklin, Jr.
Miss Sophie I. Bulow
Martin Burack
Dr. Michael S. Burnhill
A. M. Bush
Frank Camardella
Hugh Cassel
Mrs. Helen N. Ceder
Mrs. Ashley Chanler
Mrs. William Claiborne
Dr. Gerson Cohen
Robert A. Collini
Mrs. Joseph B. Conolly, Jr.
Dr. Arnold M. Cooper
Robert Corrigan
William S. Cowles, Jr.
Mrs. George W. Cox, Jr.
Kenneth W. Crowley
Edward H. Cumpston, Jr.
Vincent J. Cunningham
Mrs. Irwin W. Danz
Miss Ethel G. Dawbarn
Ronald M. Decker
Mrs. Harris Deuell
Warren Max Deutsch
Dr. Howard Dillingham
Solomon S. Dobin
David B. Duboff
John E. DuPont
Victor Dupont
Anthony C. Dynarski
Mrs. Jack Eber

Martin Edenbaum
Mrs. Seymour Eisengart
D. W. Ellsworth
Mrs. William A. Epstein
Arthur L. Fagan, Jr.
Max W. Falber
Messrs. Martin and Andrew Farber
Mrs. Colvin Farley
Victor Feigelman
Matthew H. T. Ferguson
Mrs. Amelia Fernandez
Mrs. Milton H. Fidel
Mrs. Julia Allen Field
Hon. Edward R. Finch
Dr. John W. Flemer
Miss Anna R. Fox
Miss Margaret Freund
Mrs. Howard Frome
Mrs. Dorothy W. Furman
Mrs. Ruth M. Ganeles
Mrs. Justin Gasarch
John Geismar
Dr. Nelson A. Gelfman
Master Deren Getz
Mrs. William R. Ginsberg
Milton S. Gladstone
Miss Bessie Goldenberg
Mrs. John F. Goldsmith
Mrs. Aaron Green
Mrs. Mary Anne Gavagan Green
M. Brenn Green
Henry A. Greenburg
Norman Greenfeld
Maitland Griggs
Harvey Grodjesk
Salo M. Gross
Albert Gubar
Peter Gubernick
Miss Isabel Gulick
Jerome G. Hahn
Mrs. W. A. Hale
Miss Anne Hamilton
William Hamilton
Robert L. Hart
Leonard Haskel
Edward F. Heft
Mrs. Ralph E. Henderson
Master Paul Hernandez
Karl Richard Herold
Mrs. William E. Herrlich
Miss Jenifer Heyward
Miss E. Anne Hitchcock
Herbert L. Hochberg
Dr. Eugene M. Hoenig
Charles C. Hollister
J. Laurence Hutton, Jr.
Daniel Hyman
Dr. Seymour Isenberg
Joel L. Israel
Mrs. Dorothy Jacobi
Mrs. Margaret A. Janssen
Frank D. Jonas
Mrs. Robcliff V. Jones
Mrs. Werner E. Josten
Philip H. Kable
Harry Kahn
Dr. Leonard Kahn
Dr. Benjamin Kamrin
Seymour Kehlmann
Mrs. Helen Kentner
John Steven Kinsella, Jr.
Claud W. Kissin
Howard K. Klein
William A. Knobel
Miss Ida J. Kogel
Mrs. Milton Lurie Kramer
Dr. Nancy C. Kurke
Mrs. John A. Kyle
Mrs. Barbara Landowne
Mrs. Herbert Langfeld
Mrs. F. David Lapham
Mrs. Victor R. Larsen
Jean Paul Latil
Bruce N. Lehmann
Franklin Leicht
Mrs. Erwin Lesser
Michael Levey
Dr. Louis Levine
George Levinson
Mrs. Robert A. Levinson
Charles A. Ley
Mrs. Gertrude O. Lichtenberg
Mrs. Eleanor Lichtgarn
Walter Lister, Jr.
James R. Loesch
Stanley Luckman
Mrs. Robert M. Lukeman
John F. Majeski
Kris T. Malnarick
Harold M. Manser
Louis Marcovitz
Richard H. Marks
John T. Marvin
John Louis Matthews
Mrs. John E. Mayer
Frank McGill
Roland B. McIntosh
G. Wayne McLain, Jr.
Walter A. Mendelsohn
Donald R. Miller
Mrs. Rose A. Miller
Seymour Milstein
Mrs. Elsa Miner
Mrs. Marie Minuto
Elihu H. Modlin
Robert A. Moore
Miss Virginia Moore
Joseph J. Moravek
Mrs. William Morris
John T. Moylan
Eugene T. Mudge
Asske Mukerjee
Mrs. Murray L. Nathan
Mrs. A. Nemeth
Mrs. Charles H. Nicolls
Mrs. Marvin Oberman
Miss Gail O'Neill
Mrs. Ida E. Ostermoor
Miss Louise G. O'Sullivan
Mrs. Betty Parsons
Egon Paschkes
Richard K. Paynter, Jr.
Sheldon D. Peter
Harvey Picker
Kendall Preston, Jr.
Phillip H. Prever
Martin F. Pulitzer
Mrs. Joseph Very Quarles
Leonard V. Quartararo
Miss Judith E. Randal
Mrs. Francis B. Randall
Master Stewart Read
Miss Emma Rich
Miss Barbara Jane Richards
Mrs. Irene C. Roach
Sol A. Rosenblatt
Mrs. Julian Rubin
Mrs. Charles Rusnak
Allan A. Ryan, III
Eric Schaefer
Miss Tessie Q. Schaefer
Dr. Victor Schocken
Mrs. Alexander Schoorter
Mrs. Eleanor K. Schwartz
Michael C. Senie
Robert Seymour
Mrs. Whitney N. Seymour, Jr.
Walter C. Shakun
John L. Sheahan
Mrs. Monroe Sherman
Dr. Warren T. Sherman
Ira Shpizner
William H. Simmons
Thomas D. Sloan
Miss Hilary Smith
Dr. Donald Solitar
Bill Solomon
Frederick A. Spaulding
William Spier
Leonard Starr
Henry H. Stauffer
Miss Margaret Stewart
Mrs. Wm. A. W. Stewart
Harry L. Stoll
Mrs. Caleb Stone
Miss Ruth Stratton
Mrs. F. Sturges, III
Mrs. S. Withers Swan
Hooker Talcott
Mrs. John W. Thomas
Mrs. Katharine Howe Torrey
Mrs. Arthur Train
John R. Turner
Miss Mina Turner
George A. P. Wallace
Miss Annabel W. Walter
Haidar Waly
Dr. Abraham Warsaski
Mrs. Derick V. Webb
Miss Bette Weinstein
Harold J. Weinstock
Mrs. Betty B. Weiss
Miss Stacia Wells
Mrs. Marvin Wexler
Mrs. Edwin L. Weyer
Miss Ann Trainor Willis
Mrs. Donald L. Wilson
Dr. Charles Winkelstein
Miss Helen V. D. Winter
Dr. Armour C. Wood
Allen York

NEW YORK ZOOLOGICAL SOCIETY
FOUNDED 1895

QL
1
N5X
NZP

VOL. LXVIII • No. 2 • MAR.-APR., 1965

ANIMAL KINGDOM

THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

NEW YORK ZOOLOGICAL SOCIETY

General Offices: 630 Fifth Avenue, New York, N. Y. 10020

PRESIDENT	*VICE-PRESIDENT*	*SECRETARY*	*TREASURER*	*ASSISTANT TREASURER*
Fairfield Osborn	Laurance S. Rockefeller	John Elliott	David Hunter McAlpin	Eben Pyne

EXECUTIVE COMMITTEE

Laurance S. Rockefeller
Chairman
George F. Baker, Jr.
John Elliott
Henry Clay Frick
Peter Gimbel
Robert G. Goelet
John N. Irwin, II
David Hunter McAlpin
Fairfield Osborn
John Pierrepont

BOARD OF TRUSTEES

Class of 1965	*Class of 1966*	*Class of 1967*
Charles W. Engelhard	Robert E. Blum	Alexander Aldrich
Peter Gimbel	William R. Coe	George F. Baker, Jr.
Robert G. Goelet	C. Suydam Cutting	John Elliott
John N. Irwin, II	Childs Frick	Robert I. Gannon
Warren Kinney	Henry Clay Frick	Peter Grimm
Howard Phipps, Jr.	Otto Marx, Jr.	Fairfield Osborn
John Pierrepont	David Hunter McAlpin	Eben Pyne
David T. Schiff	G. W. Merck	Laurance S. Rockefeller
Chauncey Stillman	Richard C. Patterson, Jr.	John M. Schiff
Landon K. Thorne, Jr.	John H. Phipps	Henry Sears
	Alfred G. Vanderbilt	Joseph A. Thomas
		Robert Winthrop

Ex-Officio:
The Mayor of the City of New York, Hon. Robert F. Wagner
The Commissioner of Parks, Hon. Newbold Morris

STAFF: Zoological Park, Aquarium & Other Society Activities

William G. Conway . . . . *Director, Zoological Park*
Paul Montreuil . . . . . *Director, Aquarium*
John Tee-Van . . . . . *General Director Emeritus*
Christopher W. Coates . *Director Emeritus, Aquarium*

ZOOLOGICAL PARK

Joseph A. Davis, Jr. . . . . *Curator, Mammals*
H. Bradford House . . . *Assistant Curator, Mammals*
Grace Davall . . *Assistant Curator, Mammals & Birds*
Roland Lindemann . . . . . *Consultant in Mammal Management*
William G. Conway . . . . . *Curator, Birds*
Joseph Bell . . . . . *Assistant Curator, Birds*
Herndon G. Dowling . . . . . *Curator, Reptiles*
Victor H. Hutchison . *Research Associate in Herpetology*
Allen Vinegar . *Visiting Research Fellow, Herpetology*
Charles P. Gandal . . . . . *Veterinarian*
Gordon Cuyler . . . . . *Membership Chairman & Administrative Associate*
Herbert J. Knobloch . . . . . *Curator, Education*
Jerry M. Johnson . . . *Designer, Dept. of Exhibition*
Charles B. Driscoll . . . *Superintendent, Operations*
Edward Kearney . . . . *Manager, Facilities Dept.*
Lee S. Crandall . . . . *General Curator Emeritus & Zoological Park Consultant*

AQUARIUM

Carleton Ray . . . . . *Curator*
Joseph Geraci . . . . . *Associate Curator*
Ross F. Nigrelli . *Director of Research and Pathologist*
Klaus D. Kallman . . . . . *Geneticist*
Jewell Bungay . . . . . *Business Manager*
Aage Olsen . . . . . *Superintendent*
Morris H. Baslow . . *Research Associate in Physiology*
C. M. Breder, Jr. . *Research Associate in Ichthyology*
Harry A. Charipper . . *Research Associate in Histology*
Sophie Jakowska . . . . . *Research Associate in Experimental Biology*
Louis Mowbray . . *Research Associate in Field Biology*
Martin F. Stempien, Jr. . . . . *Research Associate in Bio-Organic Chemistry*

GENERAL

Herbert F. Schiemann . . . . . *Comptroller*
Walter Lerchenfeld . . . . . *Assistant Comptroller*
Harold C. Palmer . . . . . *Assistant Secretary*
John J. McKew . . *Personnel Manager & Assistant to the Director, Zoological Park*
William Bridges . . . . . *Curator, Publications*
Ellison Smith . . . *Associate Curator, Publications*
Dorothy Reville . . . . . *Editorial Assistant*
Sam Dunton . . . . . *Photographer*
Henry M. Lester . . . . . *Photographic Consultant*
William H. Eddy, Jr. . . . . *Associate in Education*

DEPARTMENT OF TROPICAL RESEARCH

Jocelyn Crane . . . . . *Director*
Michael G. Emsley . . . . . *Assistant Director*

Associates

Jane Van Z. Brower
Lincoln P. Brower
William G. Conway
Julie C. Emsley
William K. Gregory
Donald R. Griffin
David W. Snow
John Tee-Van

AFFILIATE

L. Floyd Clarke, *Director*
Jackson Hole Biological Research Station

CONSERVATION FOUNDATION

Wallace D. Bowman
Paul Brandwein
George E. Brewer, Jr.
F. Fraser Darling
Noel D. Eichhorn
John C. Gibbs
John P. Milton
Martha Munzer
Samuel H. Ordway, Jr.
William Vogt

AFFILIATE

Richard A. Cooley, *Director*
Alaska Research Station, Juneau

ANIMAL KINGDOM

Bulletin of the
New York
Zoological Society

In This Issue

Weddell Seal Pup and Its Mother *Carleton Ray* Cover

The Noisy Underwater World of the Weddell Seal (Part 1) *Carleton Ray & William E. Schevill* 34

Apartment-building and Cliff-dwelling Parrots *William G. Conway* 40

Zoo News in Pictures *Sam Dunton* 47

China—A Land of Zoological Rarities *Al Oeming* 50

The Fine Art of "Greeting" Tigers *Joseph A. Davis, Jr.* 57

Behind the Scenes 60

Vol. LXVIII APRIL 1965 No. 2

Issued bi-monthly by the New York Zoological Society at the New York Zoological Park, Bronx Park, Bronx, N. Y. 10460. Editorial and Subscription Offices at the same address. Title registered with United States Patent Office • Subscription, $3.50 a year; single copy, 60 cents. Same rates for all foreign countries and Canada. Second-class postage paid at Bronx, N. Y. Send Form 3579 to Bronx, N. Y. 10460.

Animals and Stars

As each year passes, new and sometimes startling knowledge is being gained about animals – their ways of life and their capacities, physical as well as mental. Such knowledge flows from many and varied sources. In the main it is derived from long-protracted studies by zoologists who apply themselves to particular lines of inquiry. Those with which our own Society has recently been associated, either through sponsorship or providing financial aid, are: the studies by George Schaller of the gorilla in the Congo; by Irven Buss of the elephant in Uganda; by Alison Jolly of the lemur in Madagascar; by Jocelyn Crane of fiddler crabs, that despite world-wide distribution have strikingly similar characteristics; by Donald R. Griffin, at the Tropical Research Station in Trinidad, of the use by bats of sonar for direction finding; by the Aquarium staff of the use of electricity by the electric eel and other fishes for a similar purpose.

These instances of the Society's work are typical of countless similar efforts, to secure greater information regarding animal life, that are being made by great numbers of other organizations and individuals throughout the world.

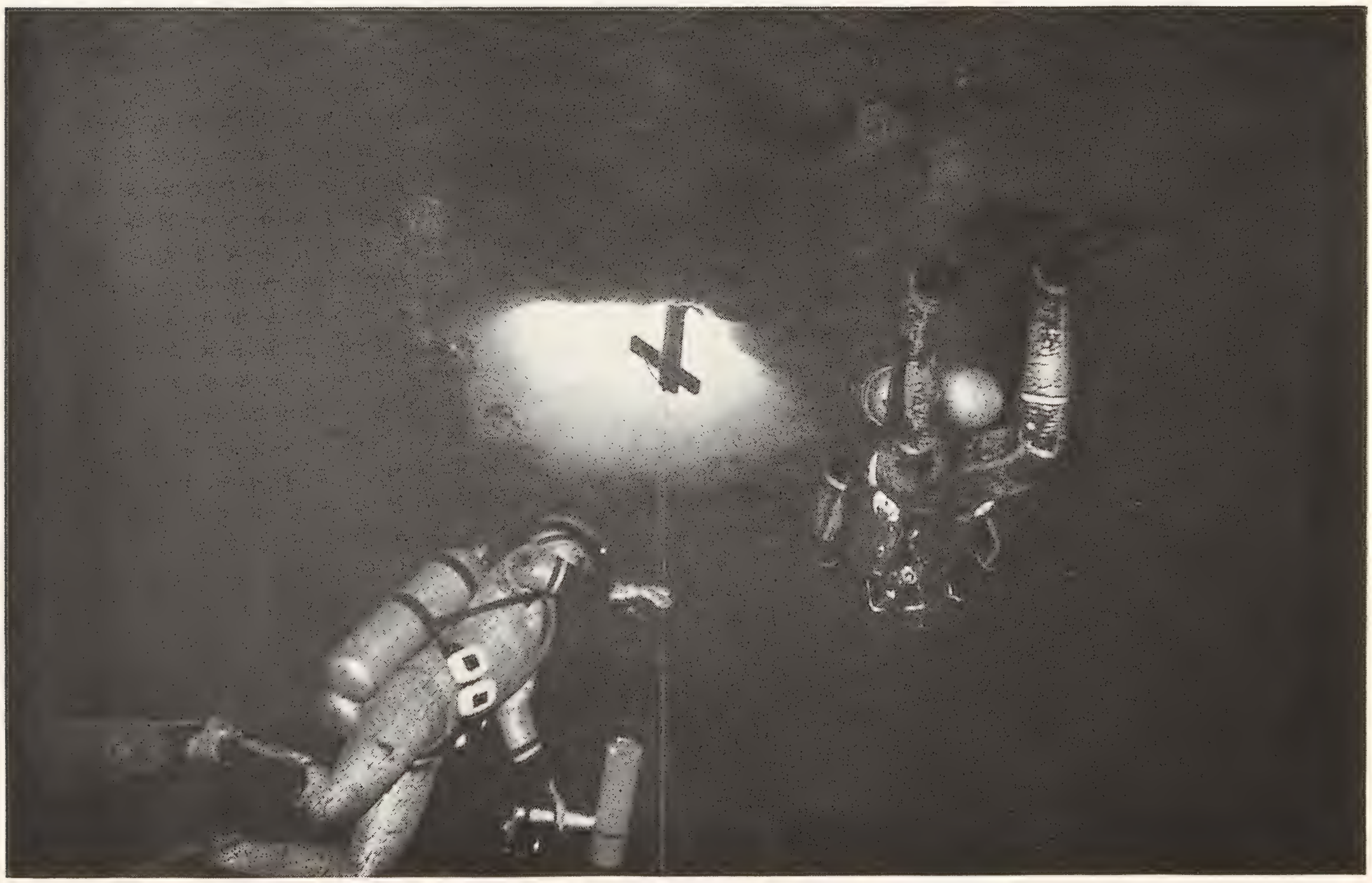
At the same time, observant people, although perhaps without scientific training, are recording observations that find their way into some journal and prompt further investigation.

Again, episodes occur such as those revealed in the book "Born Free," an authentic story of a lioness. Her return from the wild to revisit her human friends is a revelation of the powerful attachments of friendship that can occur between wild animals and people. Occasionally, similar incidents occur with other kinds of animals. There is a touch of symbolism in these occurrences suggestive of the interrelatedness of man with other forms of life on this earth.

The search for knowledge about animal life goes on. Likewise the search for knowledge concerning the distant stars and the universe around us presses forward. Constantly, with unremitting effort, there comes greater understanding, even though the ultimates of truth may never be found.

Fairfield Osborn

A Weddell Seal cruises in search of food. Its calls probably serve as a sort of sonar helping the animal to orient itself in dark waters where sight is useless. On the bottom are many starfish.



The Noisy Underwater World of the Weddell Seal (Part I)

By CARLETON RAY, *Curator, New York Aquarium*
& WILLIAM E. SCHEVILL, *Woods Hole Oceanographic Institution*

FOR THE PAST TWO YEARS the New York Zoological Society has sent expeditions to McMurdo Sound in Antarctica under National Science Foundation grants to study the Weddell Seal above water and below. On the second expedition from October 10 to December 3, 1964, the Woods Hole Oceanographic Institution joined in the work.

Thus it was that for almost two months five of us made our home on the six-foot-thick sea ice of McMurdo – William A. Watkins of Woods Hole, an acoustics expert; Peter R. Gimbel, a Trustee of the Zoological Society; Lt. David O. Lavallee, on temporary loan from the U. S. Navy to the Society; and the two authors of this article.

A home on the polar sea ice is not as bleak and primitive as it would have been, say, fifty or sixty years ago in the heroic age of Antarctic exploration – in the days of Scott, Shackleton and Amundsen. The 12,280-foot peak of Mt. Erebus towered over our large, orange-painted hut, and a broad window, a real picture window, looked out toward the Royal Society Range fifty miles to the west. Just under the window was an open hole through which SCUBA divers could go and come. Seals could use it too, and did. In this warm and comfortable hut we cooked, slept and maintained a bio-acoustics laboratory. Through a hole in the floor a thousand feet of cable connected hydrophones and poured a tumult of underwater sounds of Weddell Seals into the loudspeaker.

SCUBA equipment had its own adjacent hut from which we prepared for almost daily excursions under the sea ice.

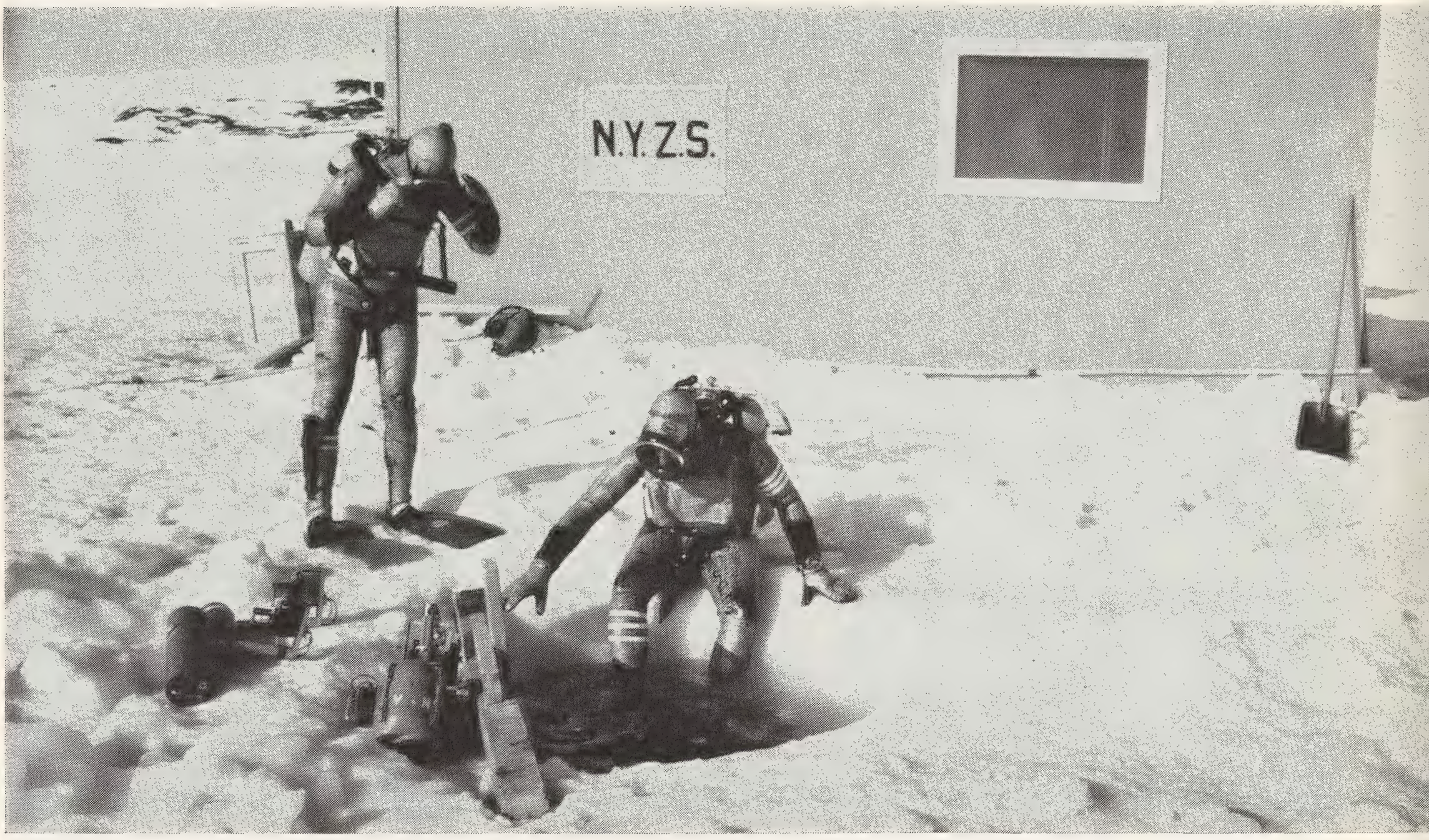
Thirty feet from the orange hut was the simple but unique device that enormously extended the research possibilities of this expedition, a six-windowed, six-by-four-foot chamber at the end of a twelve-foot tube. This Sub-ice Observation Chamber as it was called – SOC for short – would accommodate one observer who could tape-record his observations of seals simultaneously with a recording of their voices in the hut.

This little village three miles north from McMurdo Base around Hut Point was designed to give scientists their first prolonged view into the least-known and most forbidding environment on earth. With luck, we hoped it would give us the first acoustic-behavioral study of any marine mammal in nature. This research is, of course, part of the scientific program in Antarctica administered by the National Science Foundation's Office of Antarctic Programs; the U. S. Navy's Task Force 43 is responsible for logistic support. The scientific work stems from the International Geophysical Year in 1957 when Antarctica proved to be such a rewarding field for research that biology, among other disciplines, was added to the program.

The spirit which still inspires Antarctic research even in the modern scientific age, is expressed on the simple cross that stands on top of Observation Hill near McMurdo, in memory of Scott and his men:

"If you want to study a seal, be a seal," was the motto of expedition members who plunged with the aid of SCUBA equipment deep down into an unknown world to get the information they sought.

(Photos by Dr. Ray, except on Page 36 by Peter Gimbel)



"To strive, to seek, to find, and not to yield."

Antarctica is a dry, icy continent — cold enough so that the air contains little moisture. Temperatures rise to a little above freezing in summer along the coast and it is therefore not the cold that is the danger at this season, but the sudden, violent and sometimes prolonged storms of the kind that brought death to Captain Scott and his men on their return from the South Pole in the fall of 1912 not far south of McMurdo.

The great Southern Ocean from which the other oceans emanate as northward-pointing extensions is a vast ring around the continent, and there is no sea that is richer in its productive months of summer — and none which yields such a variety and number of the great marine animals and birds. This Southern Ocean is mostly covered by sea ice near Antarctic shores and through this ice less than 1% of ambient light penetrates the ice to reach the water that, at 28.6° Fahrenheit, is below the freezing point of fresh water.

There are obvious difficulties of research in this dark, cold water, but there can be no doubt that the thermoregulation, diving physiology and sonar abilities of marine mammals can best be studied in nature, no matter how difficult the environment. The usual procedure is to take the animal to the laboratory; modern technology now makes it possible to take the laboratory to the animal.

The 1963 expedition to penetrate this unknown was reported in the March-April issue of *Animal Kingdom* last year. Enough was learned during Deep Freeze 64 (as the broad scientific program is called) to justify greatly extended underwater work in Deep Freeze 65. Specifically we wanted to work on the underwater sounds of the Weddell Seal.

As long ago as 1901-04, when he was with Scott in the *Discovery,* E. A. Wilson had described the remarkable sounds of the Weddell Seal. He likened the trilling call to the "tinkling of water in a cistern."

We and two other expeditions had recorded the seal's voice in air and under water, so it was known that *Leptonychotes weddelli* possesses one of the most powerful voices of any marine animal. How does that voice fit into the total picture of the seal in its Antarctic home?

A word about the seal itself. In the first place, like other Antarctic mammals, it knows no predator on land. There are no equivalents of Eskimos or Polar Bears in the southern continent. There-

fore it is a remarkably fearless and tractable animal. Also, it is typically a species of the shore ice, restricted in its movements to areas around holes in the ice that it is able to keep open the year round. And, finally, it may be the diving champion among the pinnipeds. It is known to be able to dive to at least 1,500 feet and stay under the surface for at least half an hour. It must operate in utter blackness when it feeds on the bottom, or during the months of the sunless Antarctic night. How does it find its food and how does it home on its breathing holes – unless its orientation is by means of sound? Sonar, in short. Certainly its other senses of sight, smell, taste and touch are almost useless under the circumstances that rule a seal's life. Only sound, which travels faster and further in water than in air, provides a logical answer.

Thus it was that when we returned to Antarctica on this second expedition, we were equipped for intensive research into Weddell Seal acoustics.

Our motto from the beginning has been: "If you want to study a seal, be a seal" – in other words, get the taste and feel for its environment. We could do this in three ways. We could study seals visually and silently by means of the Sub-ice Observation Chamber; we could do it sonically by means of hydrophones and tape recorders; and we could be mobile – and somewhat noisy – as SCUBA divers.

The SOC had the very great advantage of

Carleton Ray, left, and Lt. David Lavallee prepare to enter the seals' world through a hole they have chopped. The bio-acoustics lab is in the background.

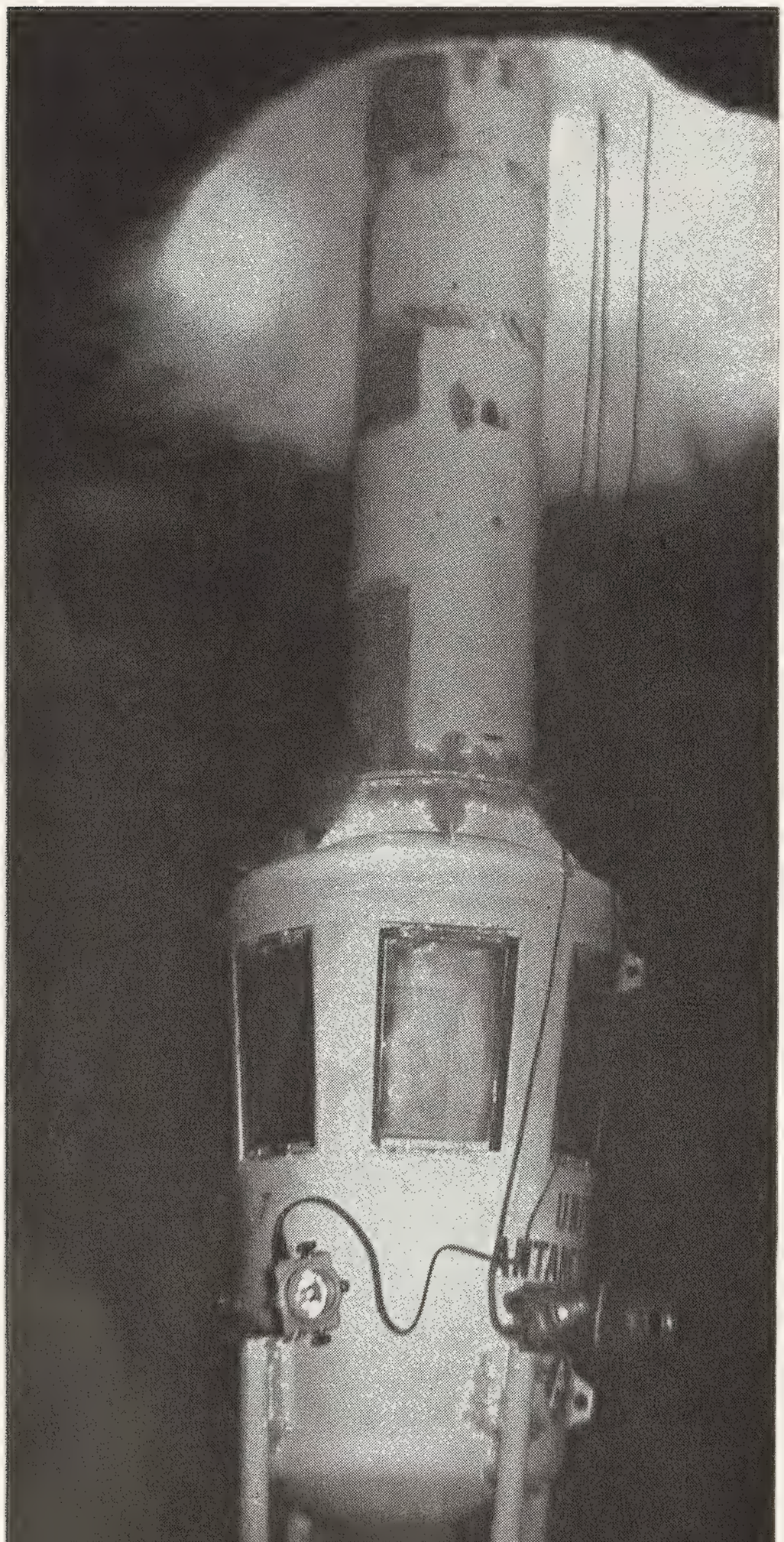
Seals maintain breathing holes by sawing back and forth across the ice with the big incisor teeth.

being silent, whereas SCUBA divers necessarily make noise when their exhaled breath bubbles to the surface, but the chamber is ponderous and could be moved only with difficulty. Its installation was carefully chosen and permanent. SCUBA divers were free to come and go at will; they could dress in our ice village, get into a tracked vehicle and dive almost anywhere afield. The combination of SOC and SCUBA would, we felt, give us the most valuable visual record of the Weddell Seal in its environment, with great flexibility.

There was one severe disadvantage, dictated by the nature of water itself. An aquatic environment is relatively opaque to the senses of man, in whom sight is so important. In even the clearest water in the world – which may well be the waters of Antarctica in October-November before the plankton bloom – a man would be able to see only a hundred yards at most. This is a remarkable distance for a man to see in water, but a short one for an active swimming mammal. On this expedition we actually measured the transparency of the water and found that sight was effective for 200 feet vertically and 240 feet horizontally just under the ice. Sound, on the other hand, travels at 4,700 feet a second in Antarctic water, five times faster than in air. From our recordings made in Deep Freeze 64 we estimated we could hear seals from perhaps a distance of five miles, so silent was the under-ice sea and so loud the voice of the seals – 40 to 50 decibels over background.

Our ice village was set up on November 3. After exploratory drillings and depth soundings, we cut three holes in the six-foot-thick sea ice. Beneath us we wanted deep water so that three hydrophones could be rigged at even intervals to a depth of a thousand feet. Weddell Seals could easily reach such a depth, and of course

Through any one of six windows in this sub-ice chamber a seated observer could watch the seals underwater and record impressions.



In the bio-acoustics laboratory on the ice, William A. Watkins, seated, discusses with William E. Schevill the sound of seals as it is picked up by the team's electronic gear.

Members of the expedition recorded calls on land as well as those made underwater. Here Lt. David Lavallee holds out a microphone while his subject, in a characteristic Weddell Seal gesture, rolls partially over and commences to thump its flipper against its side.

changes in sound emission and reception with depth are vital matters in sonar studies.

So we cut 22 tons of ice by hand and blasted out the bottoms of the holes for hydrophone cables, seals, divers and the SOC. In a fantastic display of Seabee ingenuity and energy, the SOC was lowered into the first hole. We added a diving ladder in the second hole and dragged the orange laboratory hut over the third. Plans had been made to cut an icebreaker channel early in December, and the SOC was positioned in a thousand feet of water well to the west of that channel. Five miles away to the northeast was the nearest seal rookery at Turtle Rock, and a mile to the east we knew of a small and mostly non-breeding colony of seals around what was known as the Sulphur Cone tidal crack. All in all, on November 17 we counted about 400 seals in a five-mile radius of the research complex — plenty for productive study. We had little fear that they would not come around; in the past, new holes made by men were readily adopted as breathing holes by the local seals.

By November 3 our laboratory unit contained two recorders with four channels, three for hydrophones and one for voice observation from the SOC. Telephones connected the hut and the SOC. In the diving hut were "wet" suits 5/16th of an inch thick. Diving gear was checked and stored; the three underwater motion picture cameras and four underwater still cameras were in good order. Food and cots were carried in, and over a steak dinner that first night we listened to the loud trillings and chirps of Weddell Seals being picked up by the hydrophones and broadcast by the loudspeaker.

By the end of the first two days at least two seals had set up breathing "territories" in the holes we had cut. We had made our first dive and had watched two seals fighting for room at one of the holes. These were good omens. In a later article we will describe what we saw and heard, insofar as our findings have been analyzed. But at the end of the first day we knew we were on the right track; we were living with the Weddell Seals and hearing and seeing them as they are meant to be heard and seen. Studying seals, we were "being seals."

APARTMENT-BUILDING AND CLIF

IN THE vast grassy pampas of Argentina and the great semi-arid brushland that forms northern Patagonia live two curious parrots – curious because their nesting habits are so different from those of the overwhelming majority of the world's 315 species of parrot-like birds, which generally breed in holes in trees. In the pampas dwells a parakeet called the Quaker by some, the Cotorra by the Argentines and *Myiopsitta monacha* by ornithologists. It is a gray-fronted green parakeet that builds huge apartment house nests of twigs in what, to most parrots, would seem to be unsuitable trees. Further south, in the upper part of Patagonia, is the home of the Lesser Patagonian Parrot or Barranquero, *Cyanoliseus p. patagonus,* a bird that excavates long nest burrows in the face of cliffs. Both birds have developed solutions to the problems posed by a country where suitable nesting trees are rare.

Trees are not entirely absent from the pampas, of course, and the Cotorra depends upon those that do exist to support its strange nests. What trees there are seem hardly big enough or numerous enough to provide the generous hollows fair-sized parrots need to raise their broods. The pampas is, after all, a country where the most successful woodpeckers are the flickers which dig in the ground for food and where the most numerous owls are the Burrowing and Short-eared: birds which would be perfectly happy if the whole world were treeless. However, there are two important native trees.

Here and there, standing alone, is a great

OWELLING PARROTS

By **WILLIAM G. CONWAY**
Director, Zoological Park

Robert G. Goelet, left, and William H. Drury trudge across Patagonia's semi-arid brush-land after photographing Barranqueros, parakeets that dig nest burrows in cliff faces. (All photographs by the author)

smooth-trunked ombu. Sometimes it is eight feet in diameter at the base but it tapers rapidly to crowded narrow branches. Elsewhere the pampas traveller may happen upon groves of a dense scrubby tree, about 25 feet high, called the tala. Before the colonization of Argentina by Europeans the Cotorra must have depended upon the tala for the support of its bulky nests, but this is no longer necessary today.

Today trees are not so rare on the pampas. Scattered plantings of eucalyptus, Australian pine, poplar and other species have been made by settlers everywhere. The planting is going forward with an almost frantic zeal and the wonderfully stark, uncluttered vistas that have characterized the savannas are fast disappearing, for it almost seems as if we human beings cannot stand the feeling of vast open spaces. But the new trees and the succulent new crops of the Argentine farmers are appreciated by some wild creatures, too. They must have delighted the Cotorra.

Cotorras were among the first birds I saw when I visited the pampas with Robert G. Goelet in 1960. Bob and I were then engaged in the first part of a two-segment expedition which will have, as one product, a movie about Argentine wildlife (see *Animal Kingdom,* Jan.-Feb., 1965). On

Cotorra Parakeets (Myiopsitta monacha), such as these perched in a eucalyptus tree, are found in the pampas of Argentina.

The Cotorra builds a nest unique among parrots. Although it really is very carefully constructed, the nest closely resembles a load of twigs that was upended.

that trip in 1960, and again in 1964 when we were joined by Dr. William H. Drury, Bob's friends Jaime and Loret Llavallol were our hosts at their lovely estancia, the Arazá, near Castelli. In the groves of eucalyptus trees planted around the rambling old estate house and bordering the vast marsh nearby were three colonies of Cotorras, impossible to overlook because the birds continually squawked, fought, flew back and forth and fussed about their huge twig nests.

These nests, unique among parrots, are enormous — there is no other word for them. Imagine a cart load of twigs upended and rather haphazardly supported by the forking limbs of a tree or even hanging improbably around the drooping end of a branch and you will have a fair idea of the appearance of a Cotorra's home in a eucalyptus. But neither the nests nor the colony are so disorganized as they appear. Big and messy-looking the nests may be, but they are also the product of careful construction and are even divided into separate apartments. I first examined them closely on November 23.

Stalking along the shore of the Arazá's marsh I was trying to ignore the southwest *pampero* which was vibrating my camera tripod. The object of my stealthy approach was a family of Blackneck Swans with four youngsters which were feeding along the shore near a small clump of eucalyptus trees; a lovely picture. Crouching in the cover of the high grass, I crept forward until I could get the trees between the swans and

my line of approach. Then silently moving from the trunk of one tree to the trunk of the next and waiting between dashes for the adult swans to put their heads down to feed, I adjusted my camera and prepared for a last run to the best photographic vantage point. The swans started to dip their heads again, I moved – and a series of small explosions erupted over my head. From the cluster of Cotorra nests high above, that I had ignored in my preoccupation with swans, flew dozens of parakeets screeching raucously. The result was only too predictable: a picture of one swan, the last one, just before it disappeared into the juncas and espadañas of the marsh. I devoted the rest of the morning to Cotorras.

A big nest lay on the ground at the base of one eucalyptus where it must have been blown by some unusually strong wind. Even broken it measured more than seven feet from top to bottom and it had four, possibly five, compartments. Quaker parakeets establish strong pairbonds, and each pair is reputed to occupy its own compartment within the nest. I had little time for prolonged observation, but it is my impression that group nests result mostly because pairs build close to one another, preferably on top of another Cotorra nest. This sequence seems indicated by a series of nests I found in adjoining trees in a colony near the house. In a tree which I had photographed in 1960 there had been but one small nest with a single compartment, but in 1964 there was a series of nests one on top of the other. Single nests are not uncommon and may be almost as big as a bushel basket. I watched carefully and tried to ascertain whether birds from one nest entered other nests or helped in the construction or repairs of nests other than their own, but it was a hopeless task. It was simply too easy to lose track of individuals in the comings and goings of the colony. A few weeks with a color-banded colony of Cotorras would yield much fascinating information. For the present we may make a guess that the Quaker's communal nest may not be so communal after all. Perhaps each pair works only on its own compartment and its immediate surroundings. However that may be, the nests are so complex, considering that they are constructed by the members of a simple tree-hollow-nest family, that even a single apartment deserves description.

The apartment is constructed entirely of hard knobby twigs so strongly interwoven that the structure resists dissection. While the nests I examined were in eucalyptus trees, they seemed to be composed of tala twigs. I wonder if the Cotorra may still be largely dependent upon the tala for nesting material? Eucalyptus twigs seem unsuitably smooth and straight. The nest entrance is beneath the nest proper, pointing obliquely downward. This feature should make it difficult for predators to gain access. The entrance "hall," short and tubular, leads to a slight widening called the "porch," a good place for the birds to make a U-turn or to pass. Finally, the porch opens upon the brood chamber, which is an open globular space where the birds incubate their four to eight eggs and hatch and rear their helpless naked young. With considerable difficulty I pulled a brood chamber apart and found it to be completely unlined. All in all, the nest seemed a secure if harsh sort of nursery, safe from all but the worst storms and at least as good as a tree hollow.

The parakeets are said to use the nest for sleeping when not actually rearing young and they sometimes entertain uninvited bedfellows. Now and then ducks or even hawks use Cotorra apartments as platforms for their own nests. A Chimango hawk was rearing its young in a nest fashioned atop a four-story Cotorra dwelling at the Arazá in 1960 and apparently living in harmony with its neighbors. Cotorras disregard Chimangos, Caracaras and Everglades Kites which approach their colonies but become vociferous when other hawks draw near and may act in concert to mob them. While there are reports of treeducks and Chilean Pintails using Cotorra nesting chambers, I cannot see how they could manage such a feat. If a duck proved capable of flying up into a Cotorra nest entrance (and found no aggressive homeowners present), she simply could not get in. The entrances and even the brood chambers of most undamaged nests seem far too small for the waterfowl in question. However, at least one duck at the Arazá nested, like the Chimango, on top of a Cotorra dwelling. Its anxious head and neck looked ridiculously out of place among the chattering parrots above the bulky parrot castle.

Chattering is an understatement of the Cotor-

ra's vocal production. Their screams can surely be heard for half a mile and captive birds, like many other parrots, sometimes learn to mimic a few words. David Seth-Smith in his book *Parakeets* mentions one satisfied pet owner whose bird mastered the sentence:

"Merrily danced the Quaker's wife,
with all her bairns about her."

Quakers, as the Cotorra is sometimes called, will build their strange nests in captivity and breed fairly readily. As a matter of fact, we are planning a special Cotorra exhibit in the new World of Birds building we hope to construct next year. But, despite its singular habits and undeniable interest, the Cotorra has few friends in Argentina.

A first "Congreso" has been called for "Lucha contra la Cotorra" and posters have been put up proclaiming war against the bird. Using poison, fire and firearms, Argentines are killing Cotorras by the hundreds. The birds commit serious depredations on the farmers' crops, and the spread of agriculture, combined with the plantations of trees, have provided them with new feasts and convenient flats. Of course they have multiplied and naturally they prefer grains and fruits to the seeds of the giant thistle which must have supplied much of their food in the past. But the problem is not as new as many Argentines think. Darwin commented upon the Cotorra's crop depredations in his journal 132 years ago.

DARWIN must also have been familiar with the second parrot I watched in Argentina, the comparatively rare Burrowing or Patagonian Parrot, for he spent several days sailing up the Rio Negro and exploring the area around the riverside town of Carmen de Patagones. The Barranqueros, we had been told, nest in the high barrancas or cliffs on the north shore of the river east of town. In Darwin's day Carmen de Patagones was the "most southern position (lat 41°) on the eastern coast of America, inhabited by civilized man." But expanding civilization has not necessarily improved the lot of the visitor to Carmen. Darwin arrived in a cool, clean ship; our party travelled by station wagon and had to battle trucks and cars for 974 kilometers on our way south from the Arazá. We arrived filthy and hot, with memories of tumbleweed and dust devils, and were not at all sure that we would be able to find the parrots.

But despite the aridity and the wind and dust of Patagonia, Carmen has its share of Spanish charm. There are somnolent streets, high-wheeled donkey carts and a typically ornate church. We purchased a few supplies, had our picture taken, tourist fashion, in the town square and then visited a former New Yorker named Trousdell who was ranching on the south shore of the Rio Negro. Mr. Trousdell confirmed our choice of hotel, indicated the best local restaurants and

These parrots, called Barranqueros in their native Patagonia, once travelled in huge flocks but now are comparatively few in numbers, perhaps because they have been an easy target for hunters and for farmers also.

In Patagonia, Burrowing Parrots excavate — from sandstone cliff faces — nesting holes that are between three and four inches in diameter and approximately as many feet in depth.

then . . . took us out in the back yard to watch Barranqueros fly in for the night!

As night fell the parrots gathered, gaudy screaming flocks assembling from northern Patagonia's vast expanse of dry scrub land. We had thought the bird was rare and marvelled at Mr. Trousdell's flocks as though they had appeared through spontaneous generation. The Barranquero is almost eighteen inches long, mostly olive, with blue wings, a yellow rump and a red-banded breast. The birds clustered in the tops of a long row of Lombardy poplars and squabbled for favored perches. Many apparently roost in the poplars all night but Mr. Trousdell remarked that others fly across the river to the high sandstone cliffs on the north bank where many were nesting. It grew darker, the Barranqueros became silhouettes and we joined Mr. and Mrs. Trousdell and their son Bruce for a glass of wine and a peck of conversation. We spoke of people and parrots.

Parrots were much on our minds when we awoke the next morning. Their calls were clearly audible as the birds flew over our hotel at 3 A.M. Bob fueled the station wagon and we were under way while the town was still asleep. We followed a road leading east through the scrub behind the cliffs we had seen from the Trousdell's home. Crested Tinamous dashed across our path like quail and dusky Patagonian Mockingbirds sang from fence posts. A Patagonian Cavy, resembling a huge short-eared rabbit, suddenly bounced along beside us and through the scrub to our left, with a fox in close pursuit. It was a beautiful crisp morning and, after a few false starts, we found a road leading down toward the river between the bluffs. Here the owners of a riverside farm kindly gave us permission to park our car and carry our camera gear through their vegetable gardens to the high barrancas where we hoped to find the burrows of the Barranqueros.

Were there Barranqueros up there? "Si, hay muchos!" said a farm hand. And it was true. The cliff face when we approached it was pock-marked with several dozen holes three to four inches in diameter, and a flock of nearly two dozen birds flew up and away upon our arrival. The burrows were said to be three to five feet deep and some were so low on the sandstone façade that I could just reach them. The rock

PRIMER CONGRESO
DE LUCHA
CONTRA LA
COTORRA
AVACUCHO 12 DE DICIEMBRE DE 1964
AUSPICIADO POR LA DIRECCION DE SANIDAD VEGETAL DEL M. A. A. PROVINCIA DE BUENOS AIRES

The words on the poster are in Spanish, but the message is plain. War is being declared on the Cotorra. Its unpopularity in Argentina is explained by the fact that it harms crops.

in which the parrots burrow is soft, as rocks go — but nevertheless so hard that the burrows must represent a prolonged mining effort. On one occasion I saw a bird digging and he seemed to be using his feet (like a bank swallow) and his bill as well. Bob and Bill kept on toward the larger cliffs nearer the river while I arranged my movie camera under a small willow within a few feet of the first cliff and sat down to await the parrots' return.

Years ago the Barranquero wintered as far north as Buenos Aires and could be found in immense flocks. Today it is much scarcer. The furthest north I have seen the birds was only seventy-five miles north of Bahia Blanca. There are still large numbers in a few places, but, like the Cotorra, Barranqueros are fond of the farmers' crops and are shot in considerable numbers. Shooting them is easy for it is said that the flocks show great distress when a member is killed and circle over fallen companions, thus offering the hunter repeated shots.

The birds certainly showed a strong group bond when approaching the nest burrows in my presence. First, the flock pitched into a tree nearby, two dozen strong, and silently sat watching me — and I as silently sat watching them. Then they rose and flew screaming over my head and past the face of the cliff to circle out of sight, suddenly reappearing and soaring upward in one compact group on the updrafts at the edge of the barranca. It was a lovely sight and a surprising one, for we don't expect parrots to be able to soar. Eventually, the birds landed in a small bush at the top of the cliff. After a few minutes of wary watching, relaxing into preening, two birds suddenly flew off behind me to reappear in a rush at the cliff face, vanishing in their nesting burrow before I could begin to locate them in the camera viewer. This demonstration of speed and precision flying frustrated my photographic efforts with one pair after another and I spent several hours attempting to obtain pictures of the birds at the nest entrance. When it was time to leave the parrots had become so used to me that they merely chattered as I stood up and tried to walk inconspicuously away along the foot of the cliffs.

The cliffs further east had proved more difficult for parrot photography and I met Bob and Bill on their way back. It was now completely overcast and had become quite cool. A buffeting wind was raising white-capped waves on the muddy waters of the Rio Negro. We took shelter behind a boulder at the foot of a tall barranca and opened our wine and the sandwich sacks for a very late lunch. Of course we discussed the parrots and worried about their future, for it was evident that the Barranquero and even the numerous little Cotorra could quickly be decimated by full-scale agricultural "pest" campaigns. A control program that reduces but does not endanger the birds would be a happy solution — but a solution that would require study and restraint. One can only hope that the Argentines want to preserve their birds enough to make the extra effort. Argentina has more sky than most countries and Cotorras and Barranqueros are very much a part of it.

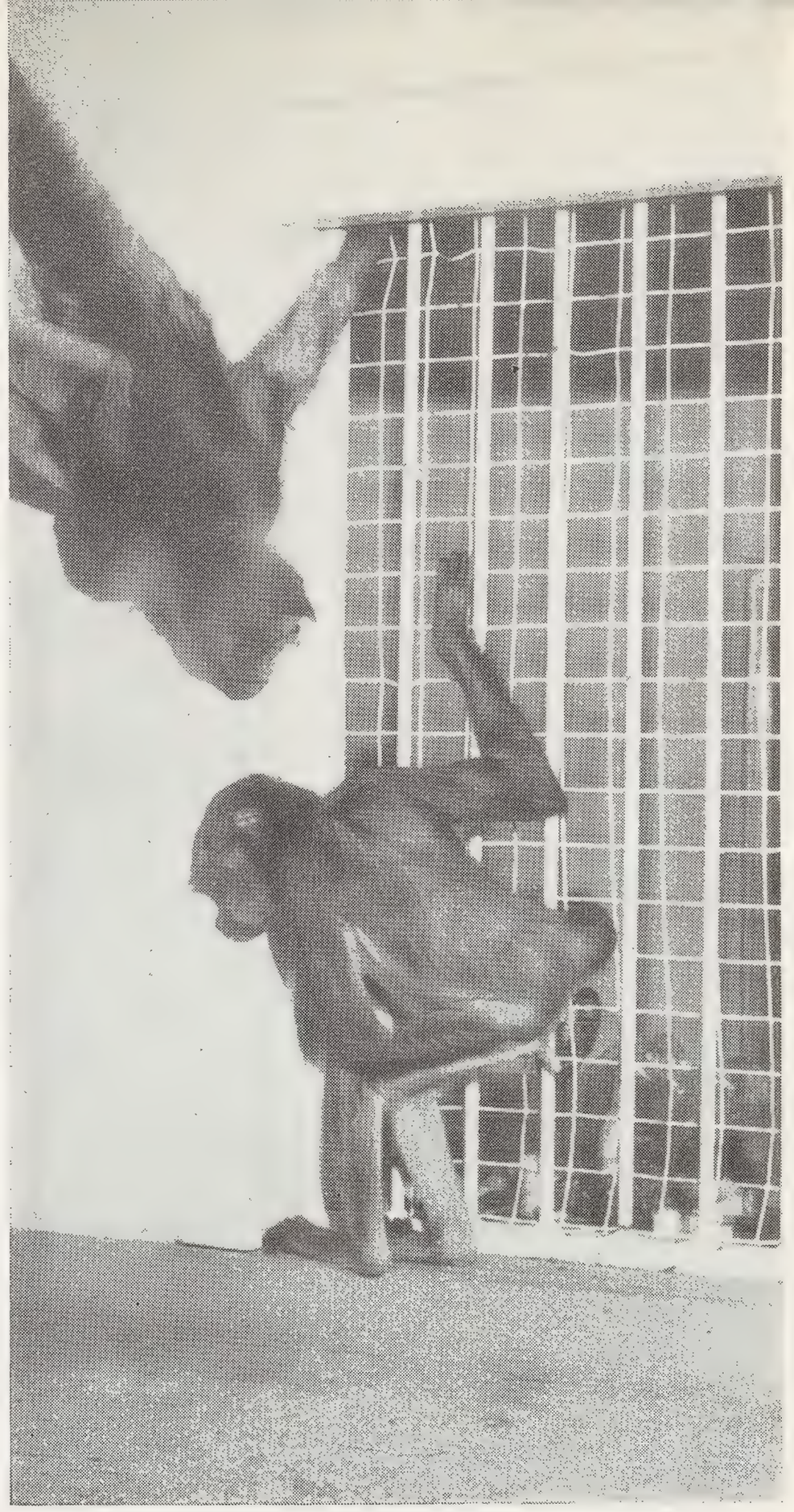
Zoo News in Pictures

Photographs by SAM DUNTON

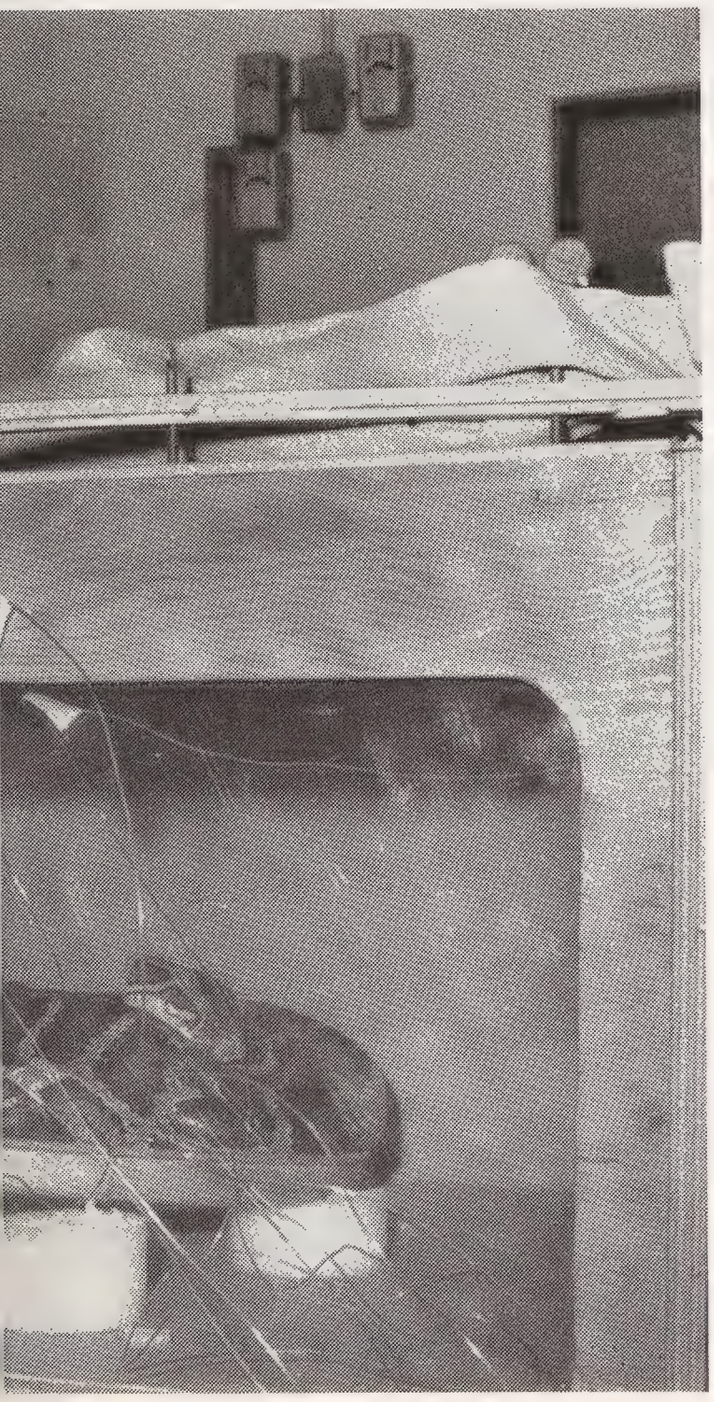
Staff Photographer

A Greater Hammerhead (*Scopus umbretta bannermanii*) peeks out from a man-made nest, devised from a wicker basket and topped with mud and sticks. The nest was supplied in hope of encouraging the birds to breed. We know of no captivity breeding since 1910.

Here is a pictorial story of the lengths to which a Spider Monkey will go to get a banana. No wonder the prehensile tails of such monkeys are often called fifth hands. At any rate, Keeper Mickey Quinn saw this monkey pick up food with its tail *inside* the enclosure. So he placed a banana six inches beyond the enclosure and, with a little coaching, the Spider soon had the fruit clutched in its tail. The fruit was moved – first 12 inches, then 18 inches, then 20 inches away. Each time the monkey claimed it by grasping it with its tail. But when the banana was moved still further, there ended the tale. That also was the tip end of the monkey's tail because it simply couldn't reach out any further.

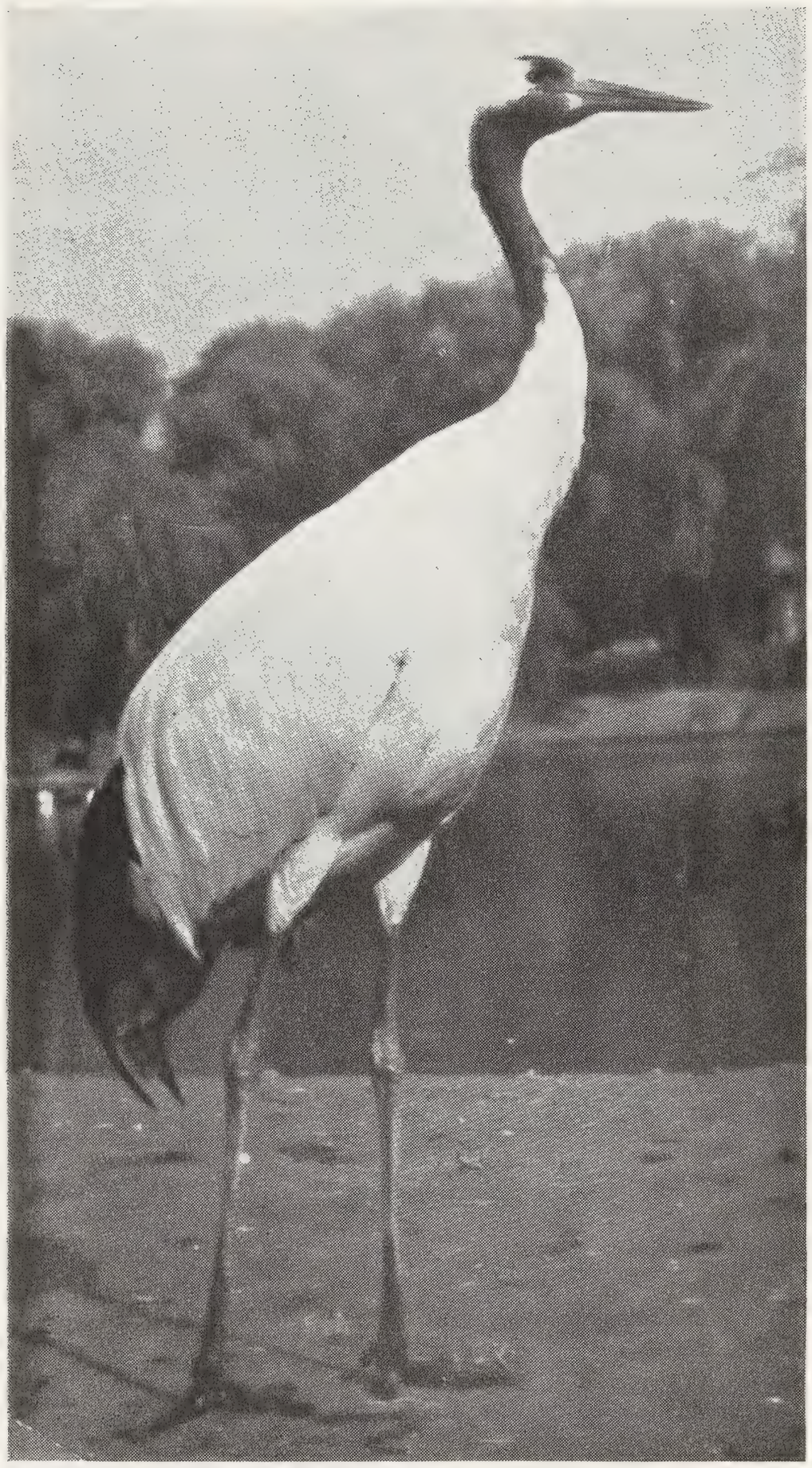


These perky little Talapoin Monkeys (*Cercopithecus talapoin*) are now on exhibit in the Monkey House and are the first the Zoo has ever had. The smallest members of the Guenon Monkey group, they are from Central Africa where they are seldom found far from waterways.



This Indian Rock Python has been coiled around a clutch of eggs in February and March. Observing is Allen Vinegar, a Visiting Research Fellow, who is making a study of changes in metabolism during incubation.

This is the time of year that the most unusual feature of the Mossy-throated Bellbird—its beard of fleshy wattles—shrinks away to virtually nothing. A photographic record is being made in hopes of correlating moulting and the wattle activity.



Manchurian Crane

Manchurian Tigers

CHINA-

Yangtze Alligator

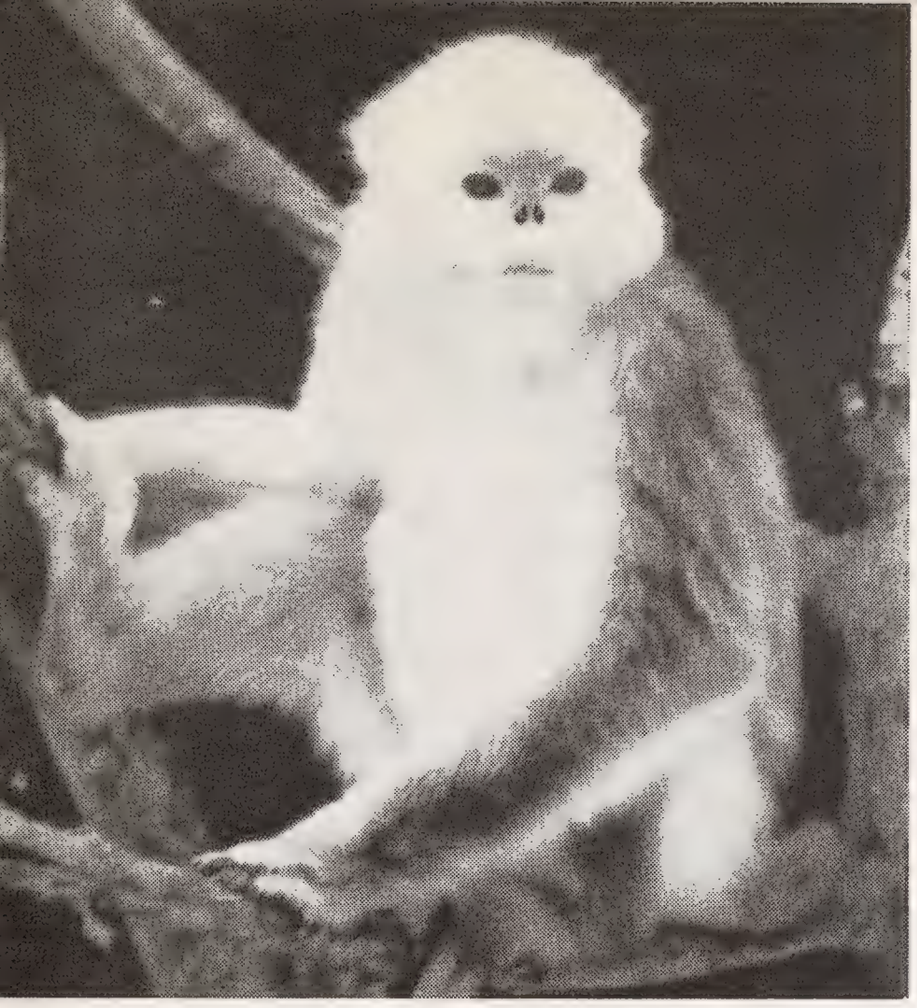
AL OEMING, the author of the article that follows, is a Canadian and Director of the Alberta Game Farm at Edmonton, Alberta, Canada. Cranes, as he mentions in the article, are one of his special interests, as are the large North American mammals; indeed, he stresses the value of his Edmonton installation as a research center for cold climate animals. The tour of some Chinese zoos he describes followed long negotiations with Chinese zoo officials, in the hope that a trading arrangement might be worked out by which China would get North American animals and the Alberta Game Farm might acquire some Chinese rarities. Since writing the article, Mr. Oeming has received permission to visit China again this year and to bring out Kiangs for his collection. — EDITOR

(Photos pp. 50-52 from Peking Zoo; pp. 53-56 by author.)

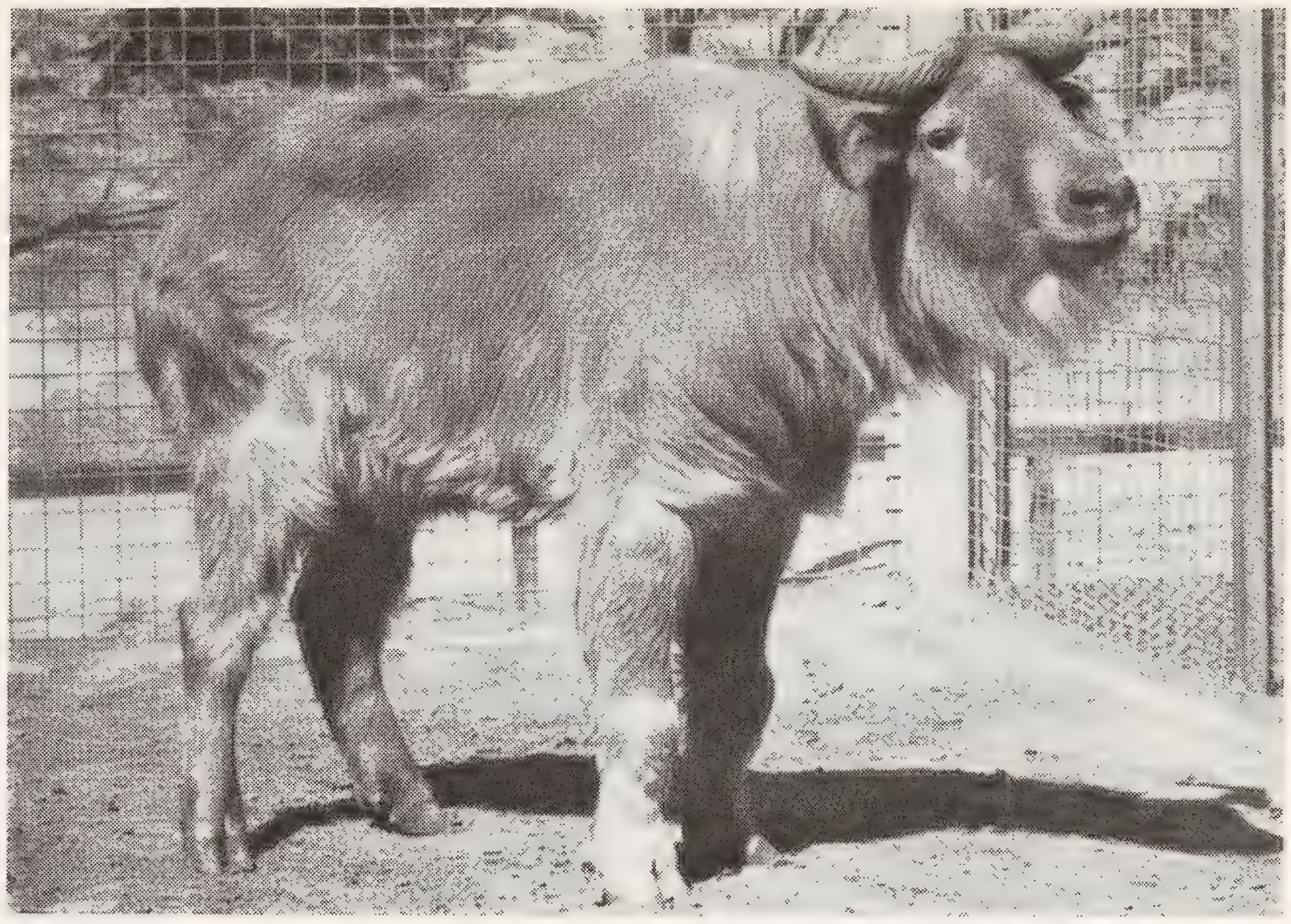
IN THE LATE FALL of last year I had an experience many a zoo man would envy. I made a month-long tour of China and visited three major Chinese zoological gardens — Canton, Shanghai and Peking. My only regret is that I was not able to travel even more widely, for China is a nation of zoos, well-stocked with rarities and certainly well-patronized by the Chinese people and their visitors.

So few detailed reports have been made on the zoos of China — even the *International Zoo Yearbook* lists only half a dozen, with few notes other than their names — that I shall attempt a listing of the animals and exhibits that particularly interested me.

The Canton Zoo was in the middle of a complete rebuilding while I was there. It is spacious — some 150 acres — and like all the zoos of



Snub-nosed Langurs



Golden Takin

A Land of Zoological Rarities

By AL OEMING

Director, Alberta Game Farm, Edmonton, Alberta, Canada

White-headed Langur

Giant Pandas

Giant Pandas, Snub-nosed Langurs (Rhinopithecus roxellanae) and a Golden Takin (Budorcas taxicolor bedfordi) are the outstanding treasures among the other zoological rarities to be seen in China's zoos.

China it was beautifully kept even during rebuilding. Hedges were trimmed to mathematical perfection, there were flower borders everywhere, trees were large and well-tended. The garden atmosphere was all the more welcome because Canton, being in the south of China, has an extremely hot and humid climate. It is a good idea to visit the zoo during the comparatively cool morning hours.

Zoo rebuilding is no novelty to me, but it was surprising to see so many projects going on simultaneously. Workmen were everywhere, digging, laying bricks and tile for new buildings, running water lines. At the rate they were going, a new Canton Zoo was rising before my very eyes.

Two Reticulated Giraffes, a pair, were temporarily housed in a makeshift corral type of enclosure made of bamboo logs. The Asian Elephant paddock was a good one with a modern

type of cement walling and moats and the bull himself was an enormous animal. I was especially interested in Manchurian Roe Deer (*Capreolus c. bedfordi*), Manchurian Wapiti (*Cervus elaphus xanthopygus*) (not unlike our own North American Elk), and a fine waterfowl display with a nice collection of Manchurian Cranes (*Grus japonensis*) and two Asiatic White Cranes (*Grus leucogeranus*). The cranes are kept on islands in large ponds and because of the heavy planting around most of the islands it was impossible to get good photographs of them; however, they can be clearly seen at a distance. The ponds were dotted with white pelicans and a variety of geese and ducks.

Canton Zoo does not go in for the mammalian Asiatic rarities likely to be seen only in China. As elsewhere in the zoo world, Chinese zoos specialize and I was assured that I would have my fill of rare mammals in Shanghai and Peking.

Shanghai is China's most populous city with some 12,000,000 inhabitants and so it is natural that it should have not only a very large zoo but one that is pleasantly park-like, with an impressive expanse of landscaped and manicured greenery. The Chinese call it their "breeding zoo," for here there is more space than in any other of that huge country's zoos.

October 1, the day of my visit, was a national holiday celebrating 15 years of rule under Mao Tse Tung. I estimated there were 50,000 visitors to the zoo that day – perhaps more.

The first breath-taker I saw in the Shanghai Zoo was a display of no less than ten Golden or Snub-nosed Langurs (*Rhinopithecus roxellanae*), from the high mountains of Szechuan in southwestern China. There were four young ones, still clinging to their mothers' breasts. A very fine large male was already in quite heavy fur; a deep, golden, lustrous pelage set off by a pale purplish face and an extremely snubbed nose. The greatest care is taken with these rare primates and they are kept behind glass in their enclosures, inside and out. My Chinese guides told me that for years they despaired of being able to keep Golden Langurs in good health, but now they have apparently mastered the technique for they are breeding well. I thought of what a sight they would make in my own Game Farm in Edmonton, Alberta – a year-round display, even when the temperature drops to 50 degrees below zero, for they spend most of their lives at snow-covered altitudes.

Shanghai exhibits the Tibetan Lynx (*Felis lynx isabellina*), a spectacular form much larger than our North American Lynx. It is said to be rare in its native habitat and also in captivity. The North China Leopard (*Panthera pardus japonensis*), on the other hand, is said to be still quite numerous and it certainly looks as if it could endure any amount of cold weather. The large cats are kept in spacious deep grotto and moated areas, the back walls usually covered with durable vines. Shanghai also had a good collection of Manchurian (*Panthera tigris longipilis*), South China (*P.t. amoyensis*) and Korean Tigers (*P. t. coreensis*).

The Peking Zoo — its gateway is shown here — is apparently the policy headquarters on zoological matters everywhere in China.

Live fish are displayed in these barrels. Species are changed almost daily, to the delight of Chinese visitors who fancy fish.

My hosts knew of my interest in cranes and they had plenty to show me. Ten superb Manchurian Cranes were the first thing I saw as I approached the crane area; there were many White-naped Cranes (*Grus vipio*) as well and deeper in a well-planted area I saw what could only be the rare Black-necked Crane, *Grus nigricollis*. The Manchurians were breeding well, I was told. At a signal from my guide, a woman

keeper entered their enclosure and began tapping on a pan, and some of the Manchurians immediately began dancing, throwing themselves high in the air and dropping their wings and flipping bits of stick about. The keeper brought in trays of food and as long as I have been keeping cranes I have never seen such a varied diet — shrimp, small fishes of many kinds, ground vegetables, larvae, grains. Little wonder that I had never seen better-looking cranes.

My Chinese friends told me that an effort would soon be made to get breeding stock of the really rare cranes of the east, such as the Hooded (*Grus monachus*), the Black-necked (*Grus nigricollis*) and the Asiatic White (*Grus leucogeranus*), so as to have continuing captivity-bred supply. The Manchurian Crane's future in China now seems assured, but the others are in real danger of being lost to the world. I do believe the Chinese will do something about it.

After admiring the crane collection, I wondered whether I might meet the Director of the Shanghai Zoo and as diplomatically as possible I put the question to my host. No trouble at all, he said, and in a few moments the keeper of the cranes came out and was introduced to me as the director of the cranes. Again and again I tried but each time I got the keeper in charge of whatever exhibit I happened to be at when I asked my question. Only the officials of the Peking Zoo were on my confirmed list of zoo people I would be able to meet. All zoo matters, I soon found out, emanated from Peking.

As we walked through the Shanghai Zoo I noticed what seemed to be thousands of visitors all going one way along a certain broadly shaded

This floral design is typical of the effort devoted to maintaining a park-like atmosphere in China's zoos. Hedges also are neatly trimmed and flower borders are abundant.

walk. My guide informed me that this led to the Giant Panda display, and that everyone knows about the panda. Like the Golden Langurs, Giant Pandas are the supreme prize in Chinese zoos, and this is attested by the care lavished on them. Their inside structures are glass-enclosed and air conditioned. The outside runs are exquisitely terraced, tree-shaded and set with ornamental natural rocks and shrubs. They are very large areas as panda exhibits go.

Shanghai had three Giant Pandas but only two ventured out from the mid-afternoon siesta so I could photograph them. One is so tame he plays with the keeper; much like a pet dog, he loves to grab at the keeper's heel and tug about with him. Fresh bunches of bamboo leaves were offered them so they might pose better for me, but they had little interest in food that day. It made no difference; I was told that I would see more in Peking.

Moose from Siberia were exhibited in Shanghai, as were Reindeer of very large size. Manchurian Sika Deer filled large paddocks, with the bucks all de-antlered. There was a large herd of Altai Wapiti (*Cervus elaphus asiaticus*), too.

A young male Giraffe had just arrived from Tanzania as a prospective mate for their single female and a future mate for two adult females in Peking. It had not yet been uncrated when I saw it in the Pachyderm House – incidentally, a *very* large, airy and completely modern building, certainly one of the largest Pachyderm Houses anywhere.

The primate collection was good but with heavy emphasis on the smaller forms, and there were Chimpanzees and Orang-utans but no Gorillas.

Most of the keepers in the Shanghai Zoo were women. Smartly uniformed in white, as were the male keepers, they went about their jobs with a thoroughness and dedication that made me ask my guide whether any of them could be induced to come to Canada to do similar work. He laughed and said China is planning on building so many large zoos in the next few years there wouldn't be enough trained keepers to meet the need in their own country.

I finally headed for Peking and the Peking Zoo with whose former Director, Dr. Tsui Chan'Ping, I had been in correspondence for several years. His successor, Mr. Liu Yu-Hua, turned out to be a handsome, well-built man of about 40. Mr. Lee, the Assistant Director, speaks English, as does Director Hua's secretary. She, incidentally, is more than a secretary; she is a cracking good zoologist and you can't stump her on any Asiatic species of zoo interest.

The Peking Zoo is one of China's main tourist attractions and my guide told me that people came from afar to see it and its Giant Pandas. Its importance in the Chinese zoo world is, of course, increased by the fact that all zoo activity is directed from here.

The zoo entrance is ornate. Large descriptive billboards, attractively painted and printed, stand just inside the entrance and help orient visitors with their distribution maps of the major mammals of the world. There is no missing an immense statue of a Giant Panda with the first baby born in captivity (Ming Ming, born Sept. 23, 1963, in the Peking Zoo). Your first impres-

sion is of a kaleidoscope of floral colors and, as everywhere, the fantastically neat and simply designed landscaping. I dare say no zoo has more trees. The city of Peking itself has planted more than fifteen *million* trees since 1949. You walk under continuous shade in any major Chinese zoo. Rest benches are liberally spotted throughout the zoo. There are no blaring loudspeakers squealing out canned music, no food vendors, no litter (absolutely no litter), no carnival atmosphere at all. The whole zoo radiates quiet character and dignity.

Peking Zoo takes a lot of digesting. There is so much to see . . . so much that is brand new to most westerners. The main attraction, of course, is the Giant Panda family. Ming Ming has now been separated from his parents and was playing about on his own. On my second day in the zoo I noticed scores of visitors around Ming Ming's outside enclosure, all laughing heartily, and I worked my way over to the stone ledge to see what was happening. Ming Ming was endeavoring to seat his round bottom on a small block of wood about five inches square. He would just about manage it, then fall off.

Director Hua told me he believed the female Giant Panda was again pregnant.

Here, again, the pandas enjoyed a glass-enclosed, air-conditioned inside compartment with lovely outdoor areas.

I was impressed by the Lesser Panda exhibit next door to the Giants. These were not the Lesser Pandas I had become used to in other zoos. They were the largest, best-furred and handsomest Lessers I had ever seen. They come from a certain area in Szechuan and obviously are a form (*Ailurus fulgens styani*) not seen in most zoos.

The large cat display is an excellent one, with a large indoor viewing space and excellent outdoor quarters. A magnificent pair of Manchurian Tigers were playing with two of their three-months-old kittens; these cats apparently breed well in Peking. There were Snow Leopards (*Panthera uncia*), Pallas Cats (*Felis manul*), Golden Cats (*Felis temmincki*), Leopard Cats (*Felis bengalensis*), North China Leopards, Pumas, Jaguars, Lions, Clouded Leopards (*Neofelis nebulosa*), South China Tigers, Korean Tigers, Black and Spotted Leopards, Sumatran Tigers (*Panthera tigris sumatrae*)—all in moated, barless, rock-type hillside exhibits. The bears were similarly displayed with taste and attractiveness.

Large painted signs containing facts about the animals in the collection abound in the Peking Zoo. Manchurian Tigers, Clouded Leopards and Snow Leopards are depicted on this one.

Large cats, such as this Manchurian Tiger, are kept in moated areas in major Chinese zoos. Durable vines cover the back walls.

APRIL 1965

Peking's reptile collection consisted mostly of forms indigenous to China and I noticed the Yangtze Alligator (*Alligator sinensis*) and a single Komodo Monitor.

Mammals I saw for the first time included Wild Yaks. Peking had two cows, apparently the only Wild Yaks in captivity anywhere. The lack of the long ventral hairs typical of domestic Yaks and the different shape of the horn distinguish them readily enough from domestic Yaks. The Chinese are making a determined effort to bring in a wild bull.

Incidentally, it might be mentioned that capturing stations operate the year around in frontier regions such as Chinghai and Sinkiang in the northwest and Yunnan and Szechuan in the southwest, and of course in Tibet and Manchuria.

There was a single male wild Bactrian Camel in a paddock with ten domestic Bactrians and Peking is trying to get more wild ones, but they are rare and difficult to obtain. Kiangs (*Equus hemionus kiang*) are being bred in the Peking Zoo; I saw five in one exhibit. There were no less than eight White-lipped Deer (*Cervus albirostris*) in one paddock – large, heavily-coated, to be seen nowhere else. They are breeding in Peking.

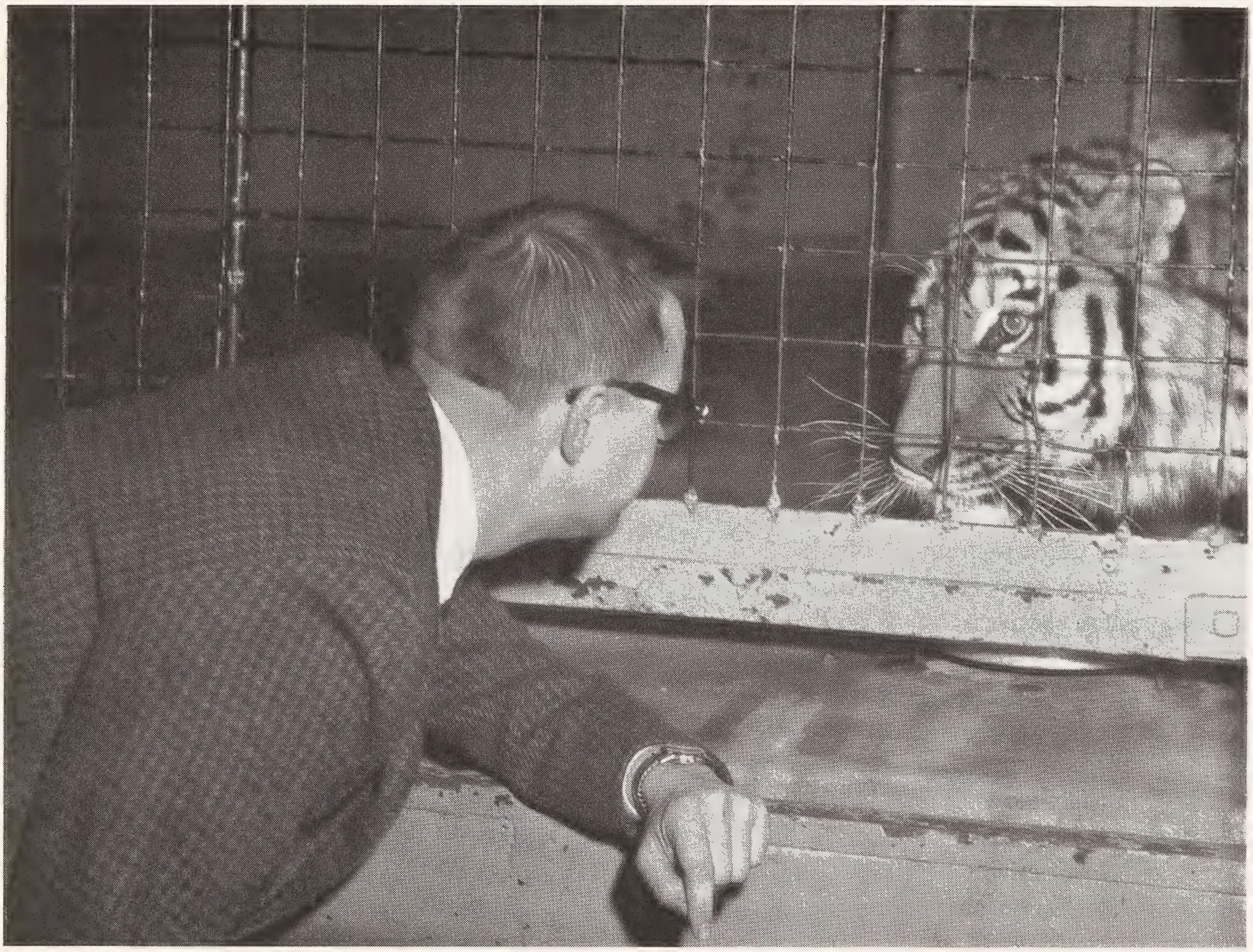
Blue Sheep (*Pseudois nayaur*) from Tibet thrive there; ten were in one paddock with at least four lambs. To enumerate a few more eye-catchers: a single male Serow from Szechuan (probably *Capricornis sumatraensis milneedwardsi*), the Szechuan Sambar (*Cervus unicolor equinus*), large numbers of Manchurian Sika Deer, Manchurian Wapiti, a single male Golden Takin (*Budorcas taxicolor bedfordi*), the latter next to a female Common Takin (*B. t. taxicolor*) from Northern Burma. I was told the next day, just as I was leaving, that word had come from a catching station in Szechuan that two female Golden Takins had been captured and were en route. I was disappointed in not seeing MacNeill's Deer (*Cervus elaphus macneilli*) but no one seemed to know its status. Only since returning home have I had word that it is not extinct and is still found in small numbers in the southern part of Sinkiang and Tibet. It is, of course, strictly protected.

The Kiang is a large wild ass found in the mountain fastnesses of Nepal, Sikkim, Tibet and southeastern Kashmir. The Peking Zoo has had considerable success in breeding it.

My travels did not take me to all the zoos of China, by any means. In Nanking the aquarium is outstanding; Chengtu, the capital of Szechuan, can boast of the three Giant Pandas in its collection, and the far northern city of Harbin also has an excellent zoo. Chungking and Tsingtao have zoos, to mention only a couple more.

Since 1958 China has had perhaps the most stringent conservation laws in the world. All rare species such as the Giant Panda, Golden Langur, Takin, Wild Yak, Wild Camel, Manchurian Tiger, White-lipped Deer and Kiang and various cranes – Manchurian, Hooded, Black-necked and Asiatic White – are on the untouchable list. They cannot be taken out of the country under zoo trade or any other arrangement unless the transaction has the blessing of the Minister of Forestry. Unless the occasion is indeed special, I should think this permission is most unlikely to be forthcoming.

Many biologists, under Dr. Tso-Hsin Cheng, Director of the Institute of Zoology at the Academia Sinica in Peking, are scouting the vast mountains and valleys of China for more information on the wildlife of the country. Dr. Wei-Shu Hsii, the very brilliant ornithologist and Director of the Natural History Museum in Peking, takes an active interest in the Peking Zoo. He is China's foremost authority on woodpeckers and is also keen on the rare Asiatic cranes. I felt, after many hours of pleasant conversation on zoo and allied topics with these scientists, that the future of zoos and wildlife in China is bright indeed.



"Chuffling" is a tiger equivalent of a friendly greeting. Curator Davis has mastered the art.

The Fine Art of "Greeting" Tigers

By JOSEPH A. DAVIS, JR.

Curator of Mammals

ANYONE who works with animals must have, or do his best to cultivate, a finely-tuned empathy toward his charges, must "get inside" the animal's mind. Some people seem to be born with this ability strongly developed, or at least develop it effortlessly as they grow; others (I think I fall into this category) possess it in a small way and must consciously nurture, analyze and train it to make it work and grow.

Empathy is no parapsychological phenomenon, and certainly it is not that parody of itself that motivates some persons who champion the "rights" of animals, the people who "put themselves inside" the animals, expecting a beast to feel peculiarly human reactions. It is hopelessly insufficient to ask "What would *I* be feeling now if I were in that tiger's place?" – the question must be "What would I be feeling now if I had *that tiger's mental reactions?*" To humanize animals, as people too often do, is folly. An animal with its non-human psychology is a no less wondrous being, no less admirable or perfect, if only it is viewed in its own framework.

Since "getting inside" the brain of an animal is a figurative expression only, in practice it involves observing the bodily postures of an animal

(these include facial expressions in some species) and any sounds it might make, and interpreting them in terms of past experiences and other knowledge of animal behavior. In general, animals that are social by nature have the best-developed means of conveying their inner states to others; those born hermits, the bears, are almost inarticulate in this sense, and many a bear has been labeled "treacherous" because it was unable to communicate a growing anger until it was moved to action.

When I walk within the guard rail of the Lion House the Jaguars watch me silently, with deadpan faces, but the toes of their hind feet flex — ever so little — for a firmer purchase on the floor. They are making ready for the death-dealing leap that fortunately never comes because of the heavy wire cage front between us. They know that the wire is there, but their Jaguar natures still demand readiness and only their toes give them away.

One feature of communication among animals of a species is that the "message" is usually, if not always, recognized by another member of the species instinctively. A great many things in an animal's makeup are learned during its life, but the basic recognition of emotional states seems to be inherited. A tiger born in the Bronx understands another freshly imported from India.

A second feature of the animal mind (and this includes our own as well) is that it practices only as much discrimination as is useful. Dogs, for example, respond appropriately to the question "Want to go out?" by jumping up and racing to the door. They would do this just as enthusiastically if the question were changed to "Are you a lout?" or "Punch your snout?" Not that the dogs are stupid — far from it; it is just that a combination of the "out" sound and the rising inflection of the question mean only one thing in their lives — a chance to romp in the yard. If the question "Punch your snout?" were repeated often enough, followed by a real punch in the snout, the dogs would learn in short order to tell the two sound sequences apart, because there would then be a practical reason for discriminating. Thus it is that an animal will often respond appropriately to a very poor imitation of its visual or vocal "language," unless it learns to reject the ersatz message for good reasons.

While I was a teaching assistant at Cornell we used to put on a simple demonstration of animal behavior — reaction to a visual signal. We used anoles, the little lizards commonly but inaccurately called chameleons. Males have a white throat as do females, but the skin under the scales of this area is red in males. Normally the red is hidden by the overlapping scales, but an aggressive male will spread his dewlap, exposing the brightly colored skin there. Another male, seeing this, responds by spreading his own dewlap. We would take a placid male, spread his dewlap and fasten it in the erect position with a flap of cellophane tape. Other males in the cage would then erect their throat patches as soon as they saw him. To top this we then taped an artificial red dewlap on a female, which then got the same response from the males, despite the poor color-match of our paper dewlap. Within bounds, even the shape could be wrong.

Last year I accidentally witnessed another and even more vivid demonstration of a response to a poor imitation. The Arizona-Sonora Desert Museum, Tucson's small but progressive zoo, has a large, low-walled enclosure that contains a variety of desert lizards. One species, a swift, is a grayish color, but males bear on either flank a vivid blue band. The blue bands serve the same function as the anole's red dewlap — they flash a challenge to other males. Since the bands are always visible, though, their mere presence does not constitute the threat; the threatening male swift bobs rapidly up and down, in a stiff-legged push-up. I had leaned over the wall to watch the lizards when I noticed a male swift on a boulder bobbing madly and watching me intently. Puzzled, I searched for an explanation and found it in my hand. I was smoking, at the time, a brand of mentholated cigarettes that came in a bright blue-green package, and, with the unconscious movements of my hands, the pack was in motion.

Now, the color of the pack was far from the lizard's blue, but not totally different, and the shape of the pack could not in any sense be described as similar to the swift's, but a swift in the desert doesn't come in contact with anything bluish and moving except another male swift, so this male responded. Once I caught on and deliberately bobbed the pack up and down, the intensity of the swift's display increased markedly. Pos-

sibly with experience the duped male would have become more discerning and lost interest in the pack, but time prevented a deeper investigation.

As it happened, two new tiger cubs once arrived at the Zoological Park in December, a time of year when we don't normally plan for new arrivals. The season didn't matter to them, because they were Siberian Tigers and had grown up outdoors, one in Copenhagen, the other in Rotterdam. Born less than three weeks apart, in May, 1962, they were already of a respectable size, and neither showed much enthusiasm for the attention the keepers and I gave them that cold night. They were downright savage, in fact.

A snarling tiger in the Bronx Zoo is an unfamiliar sight; three of the Bengals then in the zoo were hand-reared and the other captured at so early an age that he was just as well behaved. The new Siberians were reacting out of fright. We had hoped that the cubs would be introduced to one another before they were shipped to us, but it had not been possible. In the Animal Hospital we had to quarter them separately for several weeks while they underwent treatment for the inevitable intestinal parasites, and to see how well each was eating. Introducing strange animals can be a quiet, peaceable procedure or it may be chronicled in blood. At such introductions we always have a team of anxious observers, ready with hoses to interrupt any battle, because, however much preparation has gone into readying the animals for the encounter, the outcome is always uncertain.

When we did open the door between the tigers they fell upon each other, rolling and tumbling — and "chuffling," a tiger's equivalent of a friendly vocal greeting. Together, the cubs gained confidence and we were able to approach their cage without eliciting snarls or attack.

Later in the spacious quarters of the Lion House the tigers calmed down further, although neither could be described as tame. On their first day there I tried a doubtful experiment, and to my gratification (and surprise) it paid off. I chuffled at them. Chuffling is used by tigers, remember, as a form of friendly greeting, and probably too, of affection. It can be described, albeit poorly, as a staccato grunt, combining exhalation of breath and throat sound. This is as near as a tiger can come to purring, but it is never, so far as I know, done for prolonged periods, as a true purr is. A chuffling tiger is not disposed to attack, at any rate. All of our Bengals have chuffled to their keepers, and after we became acquainted accorded me the honor too. After a bit I learned that I could produce an outlandish "dialect" of the chuffle, to which our tigers respond, and it has become a ritual to be performed whenever I pass the tigers on my way through the building. Not having a tiger's laryngeal anatomy I can't master the throaty part of the greeting but I am understood, because the tigers have no need to discriminate my clumsy imitation from the real thing.

Shortly after learning to chuffle I had a sobering experience. Very pleased at having mastered the art of tiger-greeting I approached a strange tiger in the National Zoo in Washington. Standing before the cage I chuffled confidently, only to be stared down with supreme indifference by its occupant. I refused to be discouraged, and stood there for a long time repeating my salutation. At length the odd noises I uttered drew a small but intent crowd of people, until, feeling more than a trifle foolish, I conceded the day to the tiger, and never again tried it with any tiger I hadn't already met and been accepted by.

I like to dwell on a more recent success with our own tigers. That time I had made sure there were no keepers or visitors standing close to me when I leaned over the guard rail and chuffled. And chuffled. And chuffled. Just as I was about to give up one cub, then the other, relaxed its snarling grimace. Ears that had been pressed back flat straightened. The tigers slowly approached the front of the cage. One chuffled tentatively. Slowly I eased myself over the rail until I had my hand near (but not too near) the wire barrier. Briefly one cub approached, still answering my greeting, and sniffed gingerly, as the other also drew near. For an instant the spell lasted, then both ran away. Since then the tigers have grown in stature and friendliness. Good handling by their keepers has been the major factor in winning the cubs over, but I like to think back fondly, whenever we greet each other, to that first day when I came so close to making a fool of myself. Some day I may just hail another tiger in another zoo again — when no one is around.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Two New Staff Members at Zoological Park

Two new staff positions have been created at the Zoological Park and have been filled by the appointment of Ellison Smith as Associate Curator of Publications and Hugh Bradford House as Assistant Curator of Mammals.

Mr. Smith came to the Zoological Park from the Massachusetts Institute of Technology where he was editor of *M.I.T. Reports on Research*, a monthly publication. Previously he had been assistant to the Dean of Engineering at Purdue University, a staff writer on the Denver *Post* and nature reporter on the staff of the New York *Herald Tribune*. He is a graduate of the University of Virginia.

Immediately before joining the Zoological Park staff, Mr. House had been attached to the Jamaica School of Agriculture and the Institute of Jamaica as a Peace Corps volunteer. He taught zoology at the School of Agriculture and collected fish and reptiles for the science museum of the Institute during his holidays. During the summers of 1957-1961 he was Assistant Director of the Jackson Hole Biological Research Station at Moran, Wyoming. He was graduated from the University of Wyoming in 1954 and did graduate work at the University of Wyoming and the University of Kansas.

Curator and Shop Still Lead in Contest with Orangs

A new kind of push-button drinking fountain has been installed in Gorilla, Orang-utan and Chimpanzee compartments in the Great Apes House and, so far, the Curator of Mammals and the Machine Shop of the Zoological Park are slightly ahead of the young Orang-utans in their efforts to break any device the Curator and shop can devise.

For many years drinking water has been supplied to each compartment by small bubble fountains projecting an inch or so from the floor. Partly as a water-conservation measure and partly to give the anthropoid apes a "gadget" to help keep them entertained, button-operated drinkers were installed this winter. Gorillas, Chimpanzee and all the Orangs except one learned to operate the device almost within minutes. To produce a jet of water it is necessary only to depress a button that requires very little pressure. One of the four young Orangs seemingly was incapable of learning, but he did learn to stand nearby while his companions were operating the device and the normal overflow while they were playing with the button gave him water when he wanted it.

Twenty-four hours after the push button was installed, the Orangs learned to wedge a rubber tire between the button and the wall, and thus kept it flowing night and day. Then the Curator of Mammals and the Machine Shop put their heads together and invented a device that couldn't be jammed.

It could be broken, however, and so the young Orangs broke it.

After another consideration of the problem, the human opponents in the Drinking Fountain Contest have come up with a device that can't be jammed and can't be broken. At least, it hadn't been broken when *Animal Kingdom* went to press.

Education Department Has Busy Spring Schedule

Expanding its school lecture service, the Society's Department of Education has been booking all-day classroom sessions in public schools in New York City, particularly in underprivileged areas. Photographic slides made of one of our lecturers at a public school in Harlem were shown at the Denver meeting of the National Association of Science Teachers at the end of March.

An eight-weeks Saturday morning course in natural history for Junior High School students

Peering out of its compartment in the Small Mammal House is a newly-arrived Demidoff's Galago (Galago demidovii). It is the first time in several years that we have shown the animal.

in the Bronx Zoo area began on April 3, and will be repeated during the summer. A similar course for South Bronx students was given for the first time last fall.

In mid-February the department began its fourteenth training course in natural history for Girl Scout leaders and advisers, to aid them in directing Girl Scouts working for merit badges in natural history.

The department is also conducting its thirty-first semi-annual In-Service Course for teachers in the city's public schools on "Utilization of the Bronx Zoo in the Science Program of Elementary and Secondary Schools."

In June the department will assist in a series of three special tours at the Zoological Park for the children of Members of the Society. A three-weeks course in zoology for Members' children will be given on Wednesdays and Fridays, starting July 7.

During the summer the department will assist in a conservation workshop for primary and elementary school teachers from all over the country. The workshop will be held at the Bank Street College of Education.

Congo Peacock Longevity

Although it may be many years before the maximum life span of the Congo Peacock, *Afropavo congensis,* is finally determined, some indication can be gained from the longevity of the two specimens that came to the New York Zoological Park on June 15, 1949. Collected by Charles Cordier in what was then the Belgian Congo, they were the first living examples exhibited anywhere. Five of the seven birds died during the first seven years, and now one of the two surviving males has died, on March 13. It has thus set a record of 15 years, 8 months and

26 days. Death was caused by an impaction of the cloaca. The remaining bird is apparently in good health.

IN BRIEF

Seals from Antarctica. Director Paul Montreuil of the Aquarium made a flying three-weeks' visit to the Antarctic research station at McMurdo Sound in February and returned with two Crabeater Seals, *Lobodon carcinophagus,* and two Weddell Seals, *Leptonychotes weddelli,* all of which will be used in continuing research on seal acoustics at the Aquarium.

Deep Sea Collecting. A temporary field station has been established at Discovery Bay, Jamaica, for the collecting of deep sea invertebrates needed in studies on "Pharmacologically Active Chemicals from Marine Animals," a research project of the New York Aquarium supported by a grant from The John A. Hartford Foundation. Paul M. Chapman, a resident of Discovery Bay, has been engaged as a diver to make collections under the direction of Dr. Thomas Goreau, Principal Investigator of the Zoological Society's "Coral Reef Project" supported by the National Science Foundation. Dr. Ross F. Nigrelli, Director of Research and Pathologist at the Aquarium, and Dr. Martin Stempien, Jr., Research Associate in Bio-Organic Chemistry, inspected the Discovery Bay station in late February and made a preliminary collection of crinoids, brittle stars and sponges.

Perches for Leopards. The Clouded Leopard, *Neofelis nebulosa,* of India and Malaysia, is a dweller in tropical jungles and a climber of the tallest trees. We cannot provide a tropical jungle in the Lion House, but we are giving our pair of Clouded Leopards the kind of high resting places they like – heavy tree branches braced against the walls of their compartment and level enough so the animals can lie on them, legs dangling, in the greatest comfort. The walls of the compartment have been painted dark green and hidden lights will accent the animals when they leap up to their high perches.

Penguin House Improvements. After fifteen years as a constant exhibit, the Penguin House is getting a needed face-lifting. The glass front of the pool, scratched and clouded from years of cleaning and wear, cracked while it was being repolished, and provided an excuse to make over the deck and pool which were discolored and eroded by years of penguin traffic. They will be resurfaced with fibreglas. The building will reopen early in April.

Spring Madness. Lesser Magellan Geese are notoriously truculent birds and in the Zoological Park they are usually exhibited in paddocks

A lively moment in the life of an Indian Gray Heron in the Aquatic Birds Building. The compartment, newly planted with phragmites, makes an attractive setting for this heron.

where they have no close contact with other geese. For the past several years a pair has been sharing a large field with our herd of Axis Deer, and although they showed some aggression toward the deer in the past, they were never as savage as they have been this spring. With the approach of the breeding season, the male has been driving the deer so relentlessly that both birds were removed. For the remainder of the spring they will be in solitary confinement in the Ostrich House.

Student Loan Fund. Last year the Zoological Society set up a Loan Fund available to employees taking courses leading to a degree in zoology, or specific non-matriculating courses in that subject, and the first user of the fund has completed the first semester of work that will lead to a B.A. in zoology. Itzchak Gilboa, keeper in the Reptile Department, made a "B" grade in evening classes at Brooklyn College and under the regulations of the scholarship fund, the Society will reimburse 75% of his course expenses and fees.

Spring Opening. The Children's Zoo and Animal Nursery, closed since last fall, will reopen on Saturday, April 17, the traditional pre-Easter date.

PUBLICATIONS OF INTEREST

LION ISLAND. By William Bridges, with 37 photographs by Emmy Haas and Sam Dunton. 63 pp., William Morrow & Co., New York, 1965. $3.50.

A few of Emmy Haas's (and Sam Dunton's) photographs of the New York Zoological Society's latest Lion cubs have appeared in *Animal Kingdom,* but they were the merest sample of a delightful series of pictures made on the Bronx Zoo's Lion Island while the cubs were learning how to be real Lions. "Lion Island" reveals that a surprising number of small adventures can happen in such an exhibit. The text is by the Society's Curator of Publications.

THE WOODS AND THE SEA. By Dudley Cammett Lunt. Drawings by Henry B. Kane. 305 pp. Knopf, New York, 1965. $5.95.

An affectionate reminiscence of childhood and young manhood spent among people and animals, the forest and the rivers and the seashore, of the State of Maine.

AFRICAN WILDLIFE. Presented by Franz A. Roedelberger and Vera I. Groschoff; English version by Nieter O'Leary and Pamela Paulet. Introduction by Edwin Way Teale. Profusely illustrated in black-and-white and color. Viking Press, New York, 1965. $8.95.

With the exception of a few illustrations that have been too obviously retouched, this is a superb collection of African animal photographs—predominately mammals and birds. The preservation of African wildlife is stressed pictorially as well as in the text that accompanies the 274 photographs.

THE RUN. By John Hay, illustrations by David Grose. 184 pp., The Natural History Library: Doubleday & Co. and American Museum of Natural History, 1965. 95¢.

A revised paperback edition of a delightfully written and informative book, first published in 1959, about the "herring run" in the town of Brewster on Cape Cod. The spring run will be on just about the time this notice appears.

WILD HERITAGE. By Sally Carrighar. Drawings by Rachel S. Horne. 276 pp. Houghton Mifflin Co., Boston, 1965. $5.95.

A wide-ranging popularization of the current thinking of animal behaviorists, aimed at revealing to human beings their own "wild heritage."

HONKER: The Story of a Wild Goose. By Robert M. McClung. Illustrations by Bob Hines. 64 pp., William Morrow & Co., New York, 1965. $2.75.

The life history of a family of Canada Geese, told in a way that is sure to hold the attention of children. This is one of a series of young-reader life histories by Mr. McClung that have had an excellent reception.

YOU, ME AND THE ANIMAL WORLD. By Martin Wells. 114 pp., black-and-white drawings. Houghton Mifflin Co., Boston, 1964. $3.50.

Essays on a variety of zoological topics, from snails to ants to animal learning, pets not to keep, bats, animal design, and so on, written with a light touch. Mr. Wells is English, and therefore can perhaps be forgiven for perpetuating the story that there are alligators in the New York sewers.

ANIMALS AS SOCIAL BEINGS. By Adolf Portmann. 246 pp., photographs and drawings. Paperback: Harper & Row, New York, 1964. $1.85.

An inexpensive paperback edition of a valuable book first published in German in 1953.

HOW TO USE A MICROSCOPE. By W. G. Hartley. 255 pp., many drawings. Paperback: The Natural History Press, Doubleday & Co., New York, 1964. $1.45.

A paperback handbook for the "serious beginner," first published in England and now produced in an American edition. Covers phase contrast and interference microscopy and has an excellent chapter on photomicrography.

REPTILES AND AMPHIBIANS: Their Care and Behavior. By Zdenek Vogel (Translated and revised by Gwynne Vevers). 228 pp., 253 photographs (36 in color). Viking Press, New York, 1965. $12.50.

This well-printed book contains illustrations of many species of reptiles seldom seen on this side of the Atlantic. Most of the plates are of good to excellent quality but a few animals are poorly posed and some color plates (e.g., figs. 132 & 134) appear to have been retouched by an inexperienced hand.

The author obviously has had personal experience with a great many of the species included and his comments on the feeding and temperature requirements of many (particularly the smaller) species are especially welcome. However, the inclusion of the names, ranges, and one-sentence descriptions of many species not otherwise treated (apparently for the purpose of "completeness") disperses the valuable information unduly and the loose organization of material makes the text unnecessarily lengthy and repetitious. The translation ranges from the mediocre to the misleading.

We still lack that much-needed concise English guide to the proper care of amphibians and reptiles. – H.G.D.

New Members of the New York Zoological Society

(Between January 1 and February 28, 1965)

Benefactor
Mrs. W. Vincent Astor

Founder-in-Perpetuity
John N. Irwin II

Associate Founder
Hayward F. Manice
Morris Natelson

Patron
Mrs. Frank P. Shepard

Fellow
Dr. Donald R. Griffin

Life
Mrs. E. Robert Durand
Nixon Griffis
Mrs. James Q. Purdey
Mrs. Lloyd Richards
Landon K. Thorne, Jr.
George R. Wallace

Supporting
Lansdell K. Christie
Mrs. Maurice Gruber
Mrs. Norbert Heinsheimer
Robert Winthrop Kean
Peter F. F. Kissel
Mrs. John Mayer
Gustav Nyselius
Mrs. Louis J. Woolf

Contributing
John P. Axtell
Mrs. Alan Berk
Mrs. Hobart D. Betts
Mrs. Carlo Beuf
Dr. Eugene L. Bodian
George A. Braga
Dr. John M. Budinger
Gates Davison
Kyle S. Fujii
Mrs. Charles G. Gambrell
Mrs. Sunset B. Hasbrook
Mrs. Wellington Hay
Mrs. Merrit Heminway
Dr. John W. Higgins
Mrs. Jack Howard
John A. Howell
Aaron J. Jaffe
Mrs. Werner H. Kramarsky
James M. Lawrence
Mrs. Campbell Locke
Mrs. Belfort V. Marionneaux
Henry McE. Matthews
Lewis Miller
John A. Millington
Robert Mogul
Mrs. Carlton C. Norris
William I. Nichols
Dr. Phillip Pollack
Thorleif Rangen
Miss Agnes Reynolds
Alvin H. Richmond
Mrs. Quentin Roosevelt
Mrs. Carl S. Rowe
Mrs. Charles Schaffer
Mrs. Maxwell Schubert
James H. Sharp
Miss Irene F. Stritter
Mrs. Robert von Pagenhardt
Mrs. Gordon B. Whelpley
Sheldon Whitehouse

Annual
Miss Anne Adams
Mark Allstrom
Mrs. Ernest Amatniek
Wolcott E. Andrews
Sheldon M. Atlas
Dr. Irwin M. Arias
Steve Bailen
Henry R. Bankart
Donald R. Bensen
Mrs. Charles P. Berdell, Jr.
Miss Susan Bloch
Sidney Blumenberg
Mrs. Marcelle Boissonade
Mrs. Clifford A. Botway
Mrs. Kay Elizabeth Breslow
Herbert Brook
Mrs. Anna Brophy
John W. Buzbee
Mrs. Rosetta C. Carroll
Mrs. William Colina
Miss Isabel Constable
Dr. Paul J. Corcoran
Mrs. Thomas R. Cox
Miss Alice P. Cronin
Henry De La Montagne
Philip De Mario
Miss M. Dooley
Myron J. Dorf
Miss Catherine M. Dunegan
Mrs. Henry H. Eisman
Mrs. Gerard Eichenberg
Richard L. English
Mrs. Godfrey A. Ettlinger
J. Hart Evans
Harry R. Feldt
Mrs. I. Franklin Feld
Mrs. Kenneth G. Futter
Frederick C. Genz
Joshua R. Gilder
John H. Gmuer
Mrs. Morris A. Goldblatt
Paul Goldreich
Arthur Goldstein
Mrs. Carole R. Goodman
Elger N. Greenwall
Mrs. Leonard K. Guiler, Jr.
Mrs. A. Douglass Hall
Robert S. Harrison
Mrs. James Heilbrun
Miss Katherine T. Hitchcock
Mrs. Franklin Jones Horne
Miss Marguerite Hrabar
Mrs. John L. Hutton
Martin J. Katz
Miss Alice E. Kindler
Eric K. Klaussman, Jr.
Paul Kronick
Dr. Bernard Kurz
David Laskowitz
Miss Janie Curry Lee
Dr. Virginia C. Littau
Arthur Loewenthal
Dr. Irving London
Mark O. L. Lynton
Mrs. Howard D. MacPherson
Dr. Paul A. Marks
Mrs. Jane R. Mayer
Rabbi Samuel Mendelowitz
Mrs. Louis T. Milic
Mrs. George S. Miller
Morty Naishtut
Miss Eula Mae Newson
Mrs. David Norr
Miss Louise Peekham Seagle
Miss Frances Pfaff
The Rev. J. Philip Nordeck, Jr.
Clyde B. Osborn
Mrs. Mack Rapp
Mrs. Belle Trimble Ray
Sidney E. Reichman
Robert Rice
Frederick P. Rose
Joseph Raben
Mrs. Edythe Z. Salzman
Miss Erica Satzinger
Herman Siegel
Martin Slotkin
Mark Steinhacker
Paul L. Surdez
Dr. William B. Swartz
Stephen R. Tiebout
Mrs. Louis B. Tim
Martin A. Tuller
Mrs. Richard Wellish
Lloyd J. Wilkinson
David John Wilson
Miss Mildred G. Wilson
Mrs. Claus Wittich
Mrs. Henry Vaugle
C. Peter Vermann
Mrs. Robert L. Zimler
Mrs. Sidney Zimmerman

Summer Zoology Workshop

for Members' Children 11-13 years

on 6 Wednesdays and Fridays in July

In the summer of 1964, the Society's Education Department launched an experiment in down-to-earth Zoology and care of animals for youngsters. The general idea was to afford opportunity to explore the animal kingdom, develop and encourage interest and to answer questions and more questions.

Under the capable guidance of Miss Michele Perrault, the children went behind scenes to watch keepers prepare special zoo diets, feed animals, and do the housekeeping chores necessary to operate the great Bronx Zoo. You could almost hear the minds stretching.

So popular was the course and so eager the children—one little boy was so enthralled that he persuaded his mother, Miss Perrault and the Society to let him attend another session with children in an entirely different age group—that the sensible thing to do was to give a similar course for 1965.

Accordingly, the course has been planned, Miss Perrault is ready, and all that's necessary now is for Members with available children in the 11-13 year old age group to apply. The Society won't guarantee that it can show the children *everything* about the Zoo, or answer *all* the questions, or satisfy every aspiration — but we'll try.

Applications for Members' children 11-13 to be sent to:

EDUCATION DEPARTMENT
New York Zoological Park
Bronx, New York 10460

NEW YORK ZOOLOGICAL SOCIETY
FOUNDED 1895

VOL. LXVIII • No. 3 • MAY-JUNE, 1965

ANIMAL KINGDOM

THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

NEW YORK ZOOLOGICAL SOCIETY

General Offices: 630 Fifth Avenue, New York, N. Y. 10020

PRESIDENT Fairfield Osborn

VICE-PRESIDENT Laurance S. Rockefeller

SECRETARY John Elliott

TREASURER David Hunter McAlpin

ASSISTANT TREASURER Eben Pyne

EXECUTIVE COMMITTEE

Laurance S. Rockefeller
Chairman
George F. Baker, Jr.
John Elliott
Henry Clay Frick
Peter Gimbel
Robert G. Goelet
John N. Irwin, II
David Hunter McAlpin
Fairfield Osborn
John Pierrepont

BOARD OF TRUSTEES

Class of 1966
Robert E. Blum
William R. Coe
C. Suydam Cutting
Childs Frick
Henry Clay Frick
Otto Marx, Jr.
David Hunter McAlpin
G. W. Merck
Richard C. Patterson, Jr.
John H. Phipps
Alfred G. Vanderbilt

Class of 1967
Alexander Aldrich
George F. Baker, Jr.
John Elliott
Robert I. Gannon
Peter Grimm
Fairfield Osborn
Eben Pyne
Laurance S. Rockefeller
John M. Schiff
Henry Sears
Joseph A. Thomas
Robert Winthrop

Class of 1968
Charles W. Engelhard
Peter Gimbel
Robert G. Goelet
John N. Irwin, II
Warren Kinney
Peter Matthiessen
Howard Phipps, Jr.
John Pierrepont
David T. Schiff
Chauncey Stillman
Landon K. Thorne, Jr.

Ex-Officio:
The Mayor of the City of New York, Hon. Robert F. Wagner
The Commissioner of Parks, Hon. Newbold Morris

STAFF: Zoological Park, Aquarium & Other Society Activities

William G. Conway . . . . *Director, Zoological Park*
Paul Montreuil . . . . . *Director, Aquarium*
John Tee-Van . . . . . *General Director Emeritus*
Christopher W. Coates . *Director Emeritus, Aquarium*

ZOOLOGICAL PARK

Joseph A. Davis, Jr. . . . . *Curator, Mammals*
H. Bradford House . . . *Assistant Curator, Mammals*
Grace Davall . . *Assistant Curator, Mammals & Birds*
Roland Lindemann . . . . . *Consultant in Mammal Management*
William G. Conway . . . . . *Curator, Birds*
Joseph Bell . . . . . *Assistant Curator, Birds*
Herndon G. Dowling . . . . . *Curator, Reptiles*
Victor H. Hutchison . *Research Associate in Herpetology*
Allen Vinegar . *Visiting Research Fellow, Herpetology*
Charles P. Gandal . . . . . *Veterinarian*
Gordon Cuyler . . . . . *Membership Chairman & Administrative Associate*
Herbert J. Knobloch . . . . . *Curator, Education*
Jerry M. Johnson . . . *Designer, Dept. of Exhibition*
Charles B. Driscoll . . . *Superintendent, Operations*
Edward Kearney . . . . *Manager, Facilities Dept.*
Lee S. Crandall . . . . *General Curator Emeritus & Zoological Park Consultant*

AQUARIUM

Carleton Ray . . . . . *Curator*
Joseph Geraci . . . . . *Associate Curator*
Ross F. Nigrelli . *Director of Research and Pathologist*
Klaus D. Kallman . . . . . *Geneticist*
Jewell Bungay . . . . . *Business Manager*
Aage Olsen . . . . . *Superintendent*
Morris H. Baslow . . *Research Associate in Physiology*
C. M. Breder, Jr. . *Research Associate in Ichthyology*
Harry A. Charipper . . *Research Associate in Histology*
Sophie Jakowska . . . . . *Research Associate in Experimental Biology*
Louis Mowbray . . *Research Associate in Field Biology*
Martin F. Stempien, Jr. . . . . *Research Associate in Bio-Organic Chemistry*

GENERAL

Herbert F. Schiemann . . . . . *Comptroller*
Walter Lerchenfeld . . . . . *Assistant Comptroller*
Harold C. Palmer . . . . . *Assistant Secretary*
John J. McKew . . *Personnel Manager & Assistant to the Director, Zoological Park*
William Bridges . . . . . *Curator, Publications*
Dorothy Reville . . . . . *Editorial Assistant*
Sam Dunton . . . . . *Photographer*
Henry M. Lester . . . . . *Photographic Consultant*
William H. Eddy, Jr. . . . . *Associate in Education*

DEPARTMENT OF TROPICAL RESEARCH

Jocelyn Crane . . . . . *Director*
Michael G. Emsley . . . . . *Assistant Director*

Associates

Jane Van Z. Brower
Lincoln P. Brower
William G. Conway
Julie C. Emsley
William K. Gregory
Donald R. Griffin
David W. Snow
John Tee-Van

AFFILIATE

L. Floyd Clarke, *Director*
Jackson Hole Biological Research Station

CONSERVATION FOUNDATION

Wallace D. Bowman
Paul Brandwein
George E. Brewer, Jr.
F. Fraser Darling
Noel D. Eichhorn
John C. Gibbs
John P. Milton
Martha Munzer
Samuel H. Ordway, Jr.
William Vogt

AFFILIATE

Richard A. Cooley, *Director*
Alaska Research Station, Juneau

ANIMAL KINGDOM

Bulletin of the
New York
Zoological Society

In This Issue

Olaf, the Aquarium's Atlantic Walrus
Sam Dunton **Cover**

The Proboscis Monkey
James A. Kern **67**

Our Crocodilians Like It Hot
Herndon G. Dowling **74**

Zoo News in Pictures
Sam Dunton **79**

Sharing an Island Home with Puffins
D. R. Saunders **82**

Mink: The Weasel of the Waterways
Dave Mech **87**

News from the Conservation Foundation **91**

Behind the Scenes **92**

Vol. LXVIII JUNE 1965 **No. 3**

Issued bi-monthly by the New York Zoological Society at the New York Zoological Park, Bronx Park, Bronx, N. Y. 10460. Editorial and Subscription Offices at the same address. Title registered with United States Patent Office • Subscription, $3.50 a year; single copy, 60 cents. Same rates for all foreign countries and Canada. Second-class postage paid at Bronx, N. Y. Send Form 3579 to Bronx, N. Y. 10460.

Those Who Return to the Sea

OLAF, the walrus whose photograph appears on the cover page, evokes several thoughts both historical and contemporary.

From the former point of view, the marine mammals – including whales, porpoises, seals and walruses – represent forms of life of extraordinary evolutionary interest. Upon the theory that all animal life stemmed initially from an aquatic environment, it is a dramatic fact that some 50 million years or more ago, the ancestors of all present-day marine mammals lived on the land for protracted periods of time. Subsequently their successors, through miraculous physical adaptations, returned to a solely oceanic existence. Some marine mammals, of which the walrus is one, reached, so to speak, a compromise, living partly on the land and partly in the oceans. The whales and porpoises bear and suckle their young in the water. Walruses and seals, although existing primarily in water, bear and suckle their young on the land. Certainly no animals illustrate more dramatically than do marine mammals the consequences of environmental and evolutionary forces.

Today, at our Aquarium, there are gathered together a remarkably diverse collection of these great animals of the sea. Each species varies one from another in its personal characteristics, as indeed do individuals within the same species. Some appear to welcome human companionship, others remain taciturn and standoffish. None are more grotesque and appealing than this vast creature – Olaf.

Fairfield Osborn

Grotesque Honker

of the Bornean Swamps—

THE PROBOSCIS MONKEY

By JAMES A. KERN

Jim Kern Expeditions, Miami, Fla.

THE PROBOSCIS MONKEY, *Nasalis larvatus,* is undeniably one of the world's animal oddities—a fifty-pound heavyweight from Borneo endowed with webbed toes for swimming and a prodigious nose to honk commands to his troop. But despite his bizarre appearance, few naturalists have sought out this simian in his lowland swamp domain, and he does so poorly in captivity that he is rarely exhibited in zoos.

My wife, Lynn, and I journeyed to Borneo to film a variety of the island's fauna, but Proboscis intrigued us so, we spent three months of a five-month visit getting to know him.

Brunei Town, capital of Brunei on Borneo's north coast, was a good home-base for monkey-watching. Favored mangrove swamps fringing Brunei Bay grow right to the edge of town. In fact, twice in recent years huge males have been caught within its limits. Also, tides in the bay were not as variable as elsewhere along the coast. And although much of Borneo was inundated during the winter months, most of the rain in Brunei Town fell at night.

A Moslem state, rich from enormous finds of oil, Brunei dazzles the visitor with a huge, new mosque; a handsome, youthful sultan; and a flurry of state-managed development projects. But in the Brunei peopled by fisherman Malays and merchant Chinese, timeless Asian sights remain: dried squid, curry dishes, betel-stained smiles, caged birds.

We soon got the impression that Proboscis Monkeys, though a thrill for us to see, are no more or less exciting to Brunei people than 'possums and 'coons are to southern farmers. But would we find Proboscis plentiful enough to film and study within nightfall range of Brunei Town?

The thick mangrove swamps required that we look for Proboscis by boat, and we immediately sought suitable transportation. Although the Brunei Malays thought our impatience to be off into the swamps an American oddity, the afternoon of our arrival we found a fisherman willing for a fee to indulge us. That first day we counted twenty-five monkeys.

Soon we were going out on our own to monkey-watch. One of those first times we had an amazing bit of luck. We came upon Proboscis Monkeys along both sides of a stream. Later on, as we began to learn the monkey's habits, we would have known at once that we had interrupted a troop making a crossing, but we didn't realize it then.

We kept the boat moving with the idea of turning around some distance away and making another pass. Instead, Lynn looked behind her and noticed a small, impatient fellow making a break for the other side. She swung the boat around and revved the motor. We bore down on the monkey as he doggy-paddled for the other side. I focused the camera and fired away. The little monkey dove when we were almost on top of him and stayed under water until he covered the fifteen feet to the opposite bank.

Under the sharp incentive of this success we daily increased our travel of the likely streams within a day's range of Brunei Town. We made

Only the adult male Proboscis Monkey sports the prodigious nose, which most of the time hangs like a pendulous ox-tongue. When he gives his loud warning honk the nose stiffens out and up.

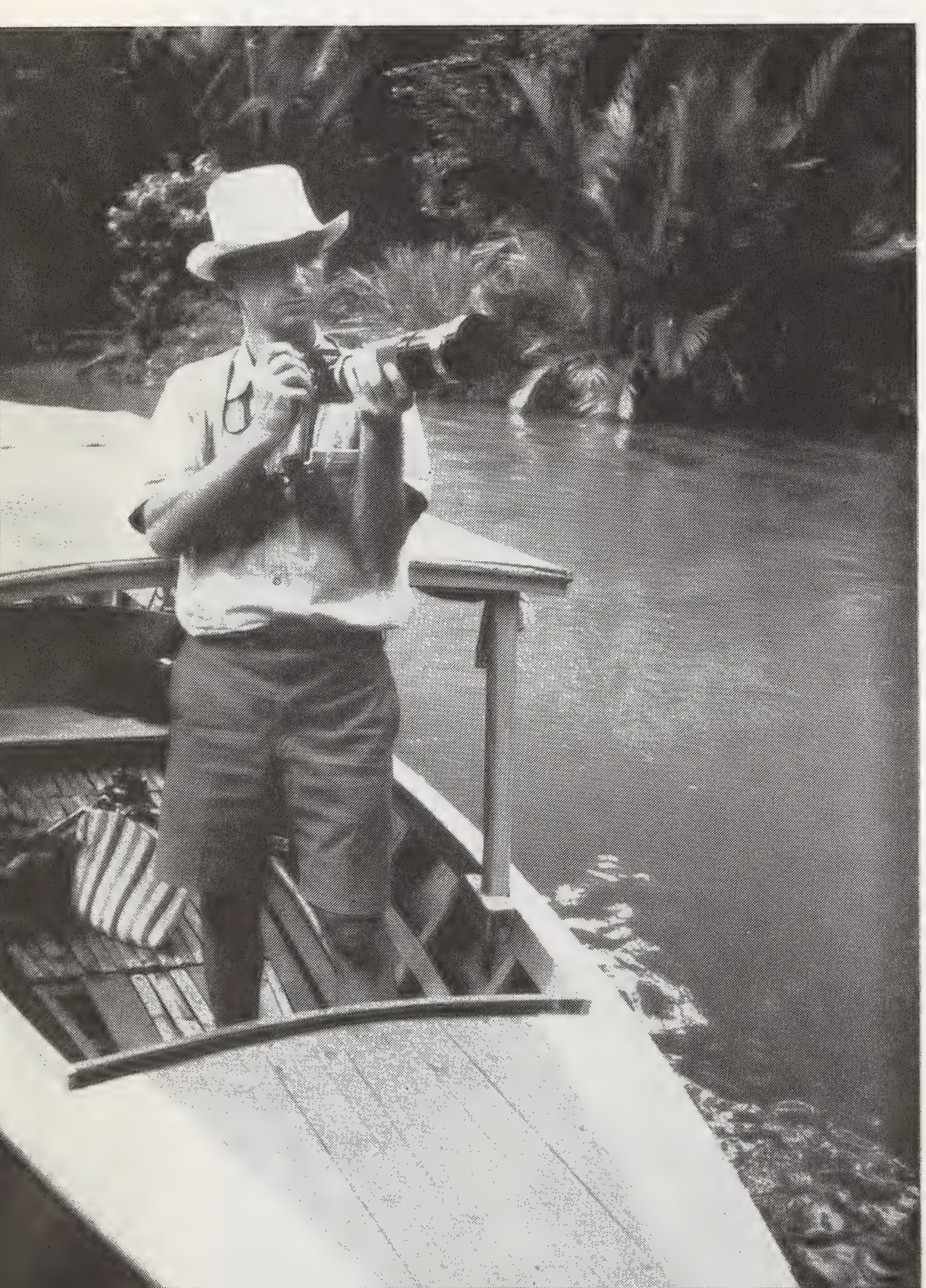
All photographs by the author

familiars of the maze of tidal reaches, some of them 300 feet broad and unlikely Proboscis territory. We had better luck along the very narrow streams lined with trees from whose branches the monkeys could swing to handholds on the other side.

Paradoxically, that noisy disturber of river quiet, the outboard motor, is both a means of reaching the Proboscis troops and a familiar assurance to the monkeys that the sputtering crafts place them in no danger. Daily the Malays' outboards traverse the streams from their villages-on-stilts to Brunei Town. Proceed noisily apace and Proboscis will continue drawing a leafy mangrove branch to his mouth; suddenly cut the motor and its mechanical noise will be replaced by shrieks and the crash of branches as the tawny patches disappear into the forest.

This fortunate Pavlovian phenomenon gave

The author discovered that the Proboscis had become accustomed to the noise of the many native boats with outboard motors. Shutting off the motor caused the monkeys to disappear.



us three months of observation of Proboscis going about his daily business of being well fed, amenable to troop living by day, and secure from the crocodile, Clouded Leopard and man in his night's sleeping eyrie high in a pedada tree (*Sonneratia alba*).

An excellent stream for Proboscis Monkeys was Sungei Rangau, entered from a hard-to-find, 15-foot, embowered mouth. Within, the banks were lush with shrubs, palms and trees bedecked with vines. A huge trunk and limb covered with moss and vines bridged our course. The enormous umbrella canopy of towering dungun trees (*Heritiera*) cast a refreshing shade. Single nipa palms thrust up their broad fronds to complete the picture of a Bornean jungle as we had imagined it.

Proboscis has much in common with his plentiful cousin, the Silvered Leaf Monkey, *Presbytis cristatus ultimus*. Both are long-tailed langurs. Both range the tree tops with accompanying shrieks and broken branches. But the smaller Silvered Leaf's passage through the jungles has not the crescendo of Proboscis. His lazy, nasal

This is the habitat of the Proboscis — waterways snaking in and around islands formed by a thick growth of mangrove trees, a good hiding place.

Brunei Town, on the north coast of Borneo, is fringed by the swamp and on occasions a Proboscis visits the town's edge. There is little hunting.

vival than the pedada. In his pedada sleeping quarters Proboscis takes bedtime snacks by picking leaves or pulling a branch to his mouth. Limbs of his favorite roosts are stripped of nearly all leaves. We could not attract Proboscis by baiting him, for with miles of fresh leaves for pasture he would have scorned our offering of soon-wilted leaves.

We often located troops by no more than the sound of breaking branches. The monkeys seemed to have an utter disregard for safety. I have seen them drop from high limbs twenty feet to branches below. They will rush along a dead branch just as they will a living one. When it snaps and falls, they fall with it, looking for the nearest thing to grab in their downward plunge in an I-was-going-that-way-anyway attitude. But they don't always escape injury. Bone fractures are common among museum specimens.

To the big male alone belongs the singular ability to make a drawn-out, groaning growl with his nose, a kind of prolonged snort. With it he extends his authority over the entire troop. If two Proboscis are feeding next to each other on a limb, sooner or later one will reach over and pull a handful of leaves from the other. Shrieks and swats ensue; the old man snorts, and everyone settles back — at least for a few minutes. We were never able to determine, though, whether authority is always held by one or whether it is sometimes shared.

Watching a female at ease with some eager youngster was a rare treat. She might seem indifferent to the antics of her young one but was

snort and his sharp, warning honk identify him, and once glimpsed, Proboscis is his unique self.

The male weighs up to fifty pounds, twice the size of the female. His nose when employed in the business of breathing is a pendulous ox tongue, but it rigidly straightens up and out with each warning honk. The female's and that of her infant are piquantly tipped upward. Shrieks apparently are her only means of self-expression.

While the monkey's favorite diet is the pedada, the mangrove is much more abundant. Proboscis does not fancy the mangrove's tightly rolled new leaves, and consequently that tree loses only its mature leaves and has better chances of leaf sur-

An adult male lifts his huge nose up to eat. These monkeys favor the leaf of the pedada tree but also eat mature leaves of the more abundant mangrove. Food is not a problem!

instantly ready if real danger threatened. Meanwhile, the young would carefully let loose of its grip on mama's fur and wander out a branch, stopping every few inches to doubt momentarily the wisdom of its move. At a safe junction on a limb the small one would just forget the world and lose himself in some serious matter: the configuration of the branches, a rough knot or a loose piece of bark. But at the very slightest disturbance he would at once scream wildly and rush back to his mother's chest.

The Proboscis troop is most active late in the day. An hour before sunset, earlier if the hot sun is hidden by clouds, the monkeys one by one climb leisurely toward their roosts in the higher trees. Pedadas are favorites because these trees are twice the height of the mangroves, and the monkeys favor sites along the water's edge—good look-outs for them. Once in the pedadas, Proboscis is easy to see and hear. His high shrieks carry well. Except for the very young clinging with all fours to their mothers, Proboscis Monkeys settle down apart from each other in their high perches, unlike the macaques and Silvered Leaf Monkeys who huddle in twos and threes. When dusk silhouetted the quiet pedada colony, we would head for Brunei Town.

We were always ready to track down any stories about Proboscis Monkeys we heard from the local people. A young Chinese timber merchant, Michael Bong, told us one day that his

Juveniles, like this appealing youngster, and the adult females have much smaller noses that are piquantly up-tilted. When very young, the Proboscis clings with all fours to its mother.

men knew where fifty Proboscis Monkeys slept every night. I didn't bother to explain to Michael that his Malay friends were challenging two assumptions regarding the habits of Proboscis Monkeys: first, that troops don't number more than twenty members; and second, that they don't sleep in the same trees every night. I just accepted his offer to visit the spot.

A two-hour ride in a swift, 20-foot longboat brought us to the place where the boys said the monkeys ought to be. I saw them first and immediately motioned to the driver to cut the motor. The river was wide and the trees were set back off the river's edge so the monkeys didn't panic. But at once they began dropping out of the higher branches in typical crashing leaps. In a frantic count Lynn got 48, I counted 50. A remarkable sight.

Two more trips to this remote area yielded no monkeys, but near the end of our study a familiar troop on the Brunei River gave us a shock. Though previously we had never counted more than 27 Proboscis, that evening we carefully counted 60 on the edge of their territory. What monkey trick was this?

The answer came at once. A troop adjoining their territory that we had never found had moved in to spend the night with our troop. The same thing must have happened regularly with the other large group. This conclusion supported our ideas that troop boundaries are flexible, that

troops are loosely organized, that peaceful relations normally exist between neighboring troops.

Although a river or hill often marks a boundary, troops share common boundaries where marginal swamplands are broad enough, yet we saw no combative defense of a territory. Silvered Leaf and Macaque Monkeys entered Proboscis territory without any sounding of danger honks or even reproving growls.

We identified seven troops and came to know intimately the habits of three of them. Small troops occupy about a half a square mile. If the territory includes one or more streams or if the troop is a large one, the total area may be larger.

The movement of the troop through its territory is erratic. Monkeys may be seen in the same trees for five or six consecutive evenings, or they may move from one end of their territory to the other in half a day. No doubt it is the male leader who decides. As a loose union, members

Pedadas are favorite roosting trees because they are twice as high as the mangroves. Eight Proboscis are in this troop — only three can be clearly seen.

This female seemed indifferent to the exploring youngster on her right, but the slightest disturbance and she was instantly ready if danger threatened.

A Proboscis is endowed with webbed toes and is a good swimmer but it prefers the safety of a tree-top jungle. The author saw one of the monkeys swim 15 ft. underwater to shore.

may stretch out for one third of a mile along a river bank. They may ascend into trees for the night a thousand feet apart, and except for mothers with young, they feed and sleep individually.

Perhaps horsefly bites and tedious waiting were the price we paid for another conclusion about Proboscis which did not agree with our advance reading. This contended that Proboscis swims for the pleasure of it. He has, indeed, a partial web between two toes. Vestigial remnant of high sport in the water this may be. Yet we only came on Proboscis swimming when the river to be crossed was too wide for a bank-to-bank trapeze act. The one time when we saw an entire troop crossing was exciting to us but could hardly have been pleasurable to the monkeys.

Since we knew what trees the monkeys preferred, I was suspicious when, one day, we found a troop high in a dungun tree that leaned out over the water. We kept the boat moving, fearful of disturbing them. About seven hundred feet from the tree, the stream took a sharp turn. We tied up on the far bank so we could look back toward the dungun. The monkeys couldn't be seen among the foliage. We were watching quietly when it happened.

Ker-splash, ker-splash! The whole troop, one after the other, began leaping from the heights of the dungun toward the center of the stream, smacking the water with loud belly-flops. There were momentary pauses, but within thirty seconds the show was over. About twenty-five monkeys had made the crossing.

The troop had choosen to cover half the distance of the stream by air rather than swim it. Animals play, and Proboscis no doubt does, but this could not have been fun. By the clap they made, those belly-flops must have hurt. I measured the distance from the water to the limb: 53 feet! Their vulnerability to crocodiles and man may be the reason for their avoidance of water.

Today in Borneo the Proboscis Monkey is in no serious danger. He is protected in Sarawak, North Borneo and Kalimantan. Even in Brunei a few Chinese seem to be the only human beings interested in the monkey's meat, but few of these will stray very far from their shops to hunt him. The Malays are not hunters either. In fact, we never saw anyone hunting monkeys in Brunei although it is not illegal. Most important, Proboscis prefers totally undesirable real estate from man's point of view. His love of the swamps is his best guarantee of survival.

OUR CROCODILIANS LIKE IT

By HERNDON G. DOWLING

Curator of Reptiles

OF ALL THE MANY REPTILES still living on this earth, the crocodilians are the most impressive. Relics of past ages, close relatives of the dinosaurs, they are representatives of a branch of life that is otherwise extinct. Some of them attain a length of 20 feet and a weight of well over 1,000 pounds – dragons indeed!

All but two or three of the twenty-one crocodilians that survive in our day have been exhibited in the Reptile House at one time or another and in recent years twelve to fifteen species have been on display at the same time. They thrived, too, but it was not always thus. During the early years, before the Reptile House was renovated, the crocodilians led a rather precarious existence. Alligators refused to eat during the winter months; caimans were so lethargic that they would hardly open their eyes, and even "Joe," the Nile Crocodile, had to be slapped in the face with a fish before he would wake up for his dinner.

The basic problem, of course, was temperature – and particularly water temperature. The tap-water temperature that ranges down into the fifties and even into the forties in New York winters just could not be heated enough by the steam-pipes of the pools to give the proper impetus to the digestive systems of these tropical animals. Only the temperate-zone American Alligators were able to lead anything like a normal existence – and then only in the summertime when enough sunlight penetrated the skylighted roof to allow them to bask in its rays. Such a situation made for easy maintenance and clean pools, but was hardly ideal for crocodile livelihood. It was probably in such times and under such conditions that growth estimates of "an inch and a half per year" were made in even professional journals.

In 1954 the interior of the Reptile House was renovated and a warm-water line was introduced into the crocodilian pools. The water temperature jumped from the low seventies to the high eighties and suddenly the problem of feeding changed from that of getting the crocodiles to eat to that of keeping them from eating one another – with perhaps a Keeper thrown in for dessert! It was only then that the much-vaunted differences in temperament between alligators and crocodiles became evident in the Reptile House. And it was only then, too, that it became possible to maintain a variety of tropical crocodilians here. This variety soon exceeded that of any other zoological garden.

With warm water and all the food they could eat, the crocodiles began to show what they could do in terms of growing. A Salt-water Crocodile eighteen inches long one year would be twice that long the next. A Slender-snouted Crocodile would add more than a foot to its length each year. Such phenomenal rates of growth had not been allowed for even in the renovated Reptile House, so for several years we have made a practice of donating surplus members of our burgeoning crocodilian collection to less well-endowed institutions. We have sent alligators to England, caimans to Yugoslavia and various other crocodilians to many of our sister zoos in the United States. Only recently we have sent several of our largest rare and valuable crocodiles, all reared from babies, to Buffalo, Houston, Pittsburgh and St. Louis. A ten-foot pool simply will not contain a ten-foot-and-still-growing crocodile!

Why did I introduce these reptiles as "relics of past ages"? A glance at their history gives the answer. The first fossil skulls, flattened for aquatic life, that are recognizable as crocodilian occur in sediments of late Triassic time. From this beginning, some 180 millions of years ago, crocodilians flourished along with dinosaurs during the Age of Reptiles – and narrowly escaped becoming extinct with them at the end of the Mesozoic Era.

Their long hind legs and short forelimbs, in-

herited from some bipedal ancestor, give proof that these aquatic beasts arose from the same branch of reptilian life that gave rise to the dinosaurs, to the pterosaurs and to the birds. Although superficially birds and crocodiles do not look much alike, they still retain a sizeable number of anatomical resemblances. Having early taken up aquatic life, crocodilians seem to have made the most of it. The culmination of their development, at least in size, was in the Cretaceous crocodile from (where else?) Texas. Named *Phobosuchus,* it had a skull measuring a full six feet in length and the entire animal must have

Our big bull American Alligator weighed less than a pound in 1950 and now is over 10 ft. and weighs over 514 lbs. Thunderstorms and passing trucks can make him bellow and roar.

exceeded forty feet. Such an animal probably preyed on at least the smaller dinosaurs that approached its watery lair.

None of our present-day crocodilians approach the size of *Phobosuchus,* though some of them do exceed twenty feet. Although its aquatic adaptations separate it from the mainly terrestrial dinosaurs, a crocodile — particularly a big one — is

still the nearest thing to a dinosaur that can be seen alive. When we look at one, we are truly looking at a Cretaceous reptile, virtually unchanged during the last 100 million years.

Fossils found in Europe, northern Asia and the northern United States show that crocodilians were much more widely distributed during the warm and humid Mesozoic ages. With the rising of the modern mountain ranges and the consequent cooling of the earth's climate during the Cenozoic Era, they become more and more restricted toward the equator. How near crocodilians were to following their Cretaceous companions and relatives into extinction is shown by the few kinds that survive. Only twenty-one species still remain.

Today's Crocodilians	Region	Average adult	Maximum known
ALLIGATORS (Alligatorinae)			
American (*Alligator mississipiensis*)	America	8-10 feet	19 feet
Chinese (*Alligator sinensis*)	Asia	4-5 feet	5.5 feet
CAIMANS (Alligatorinae)			
Black (*Melanosuchus niger*)	America	10-12 feet	15 feet
Spectacled (*Caiman crocodilus*)	"	5-7 feet	8.5 feet
Broad-nosed (*Caiman latirostris*)	"	5-6 feet	6.5 feet
Smooth-fronted (*Paleosuchus palpebrosus*)	"	3-4 feet	5 feet
Dwarf (*Paleosuchus trigonatus*)	"	3-4 feet	4 feet
CROCODILES (Crocodylinae)			
American (*Crocodylus acutus*)	"	10-12 feet	23 feet
Orinoco (*Crocodylus intermedius*)	"	10-12? feet	21? feet
Cuban (*Crocodylus rhombifer*)	"	6-8 feet	12 feet
Morelet's (*Crocodylus moreletii*)	"	6-7 feet	8 feet
Nile (*Crocodylus niloticus*)	Africa	10-12 feet	21 feet
Slender-snouted (*Crocodylus cataphractus*)	"	6-8 feet	8 feet
Dwarf (*Osteolaemus tetraspis*)	"	4-5 feet	6 feet
Salt-water (*Crocodylus porosus*)	Asia, Australia	12-14 feet	20+ feet
Australian (*Crocodylus johnsoni*)	Australia	6-7 feet	8 feet
New Guinea (*Crocodylus novaeguineae*)	Asia, Australia	6-8 feet	9 feet
Siamese (*Crocodylus siamensis*)	Asia	8-10 feet	12 feet
Swamp (*Crocodylus palustris*)	"	8-10 feet	13 feet
False Gavial (*Tomistoma schlegelii*)	"	10-12 feet	16 feet
GAVIALS (Gavialinae)			
Indian (*Gavialis gangeticus*)	"	12-15 feet	21.5 feet

Only five of these range outside the tropics. But two do not enter the tropics at all. These are the two species of alligator. Our own American Alligator is found in the southeastern United States and its closest relative, the Chinese Alligator, is found along the Yangtze River of southeastern China. This is a familiar distributional pattern, found also in the giant aquatic salamanders (Cryptobranchidae), the Moccasins (*Agkistrodon*), and others. It probably means nothing more than that these two areas have been moist and warm — and thus habitable for such creatures — for the entire seventy million years since the Mesozoic.

American Alligators were well on the road to extinction in this century until Florida began protecting them from the hide-hunters and from the purveyors of "baby alligators" for the pet trade. In recent years they have become common again in the lakes, rivers and roadside ditches of that state but nowhere have they become as common as described by William Bartram, who vis-

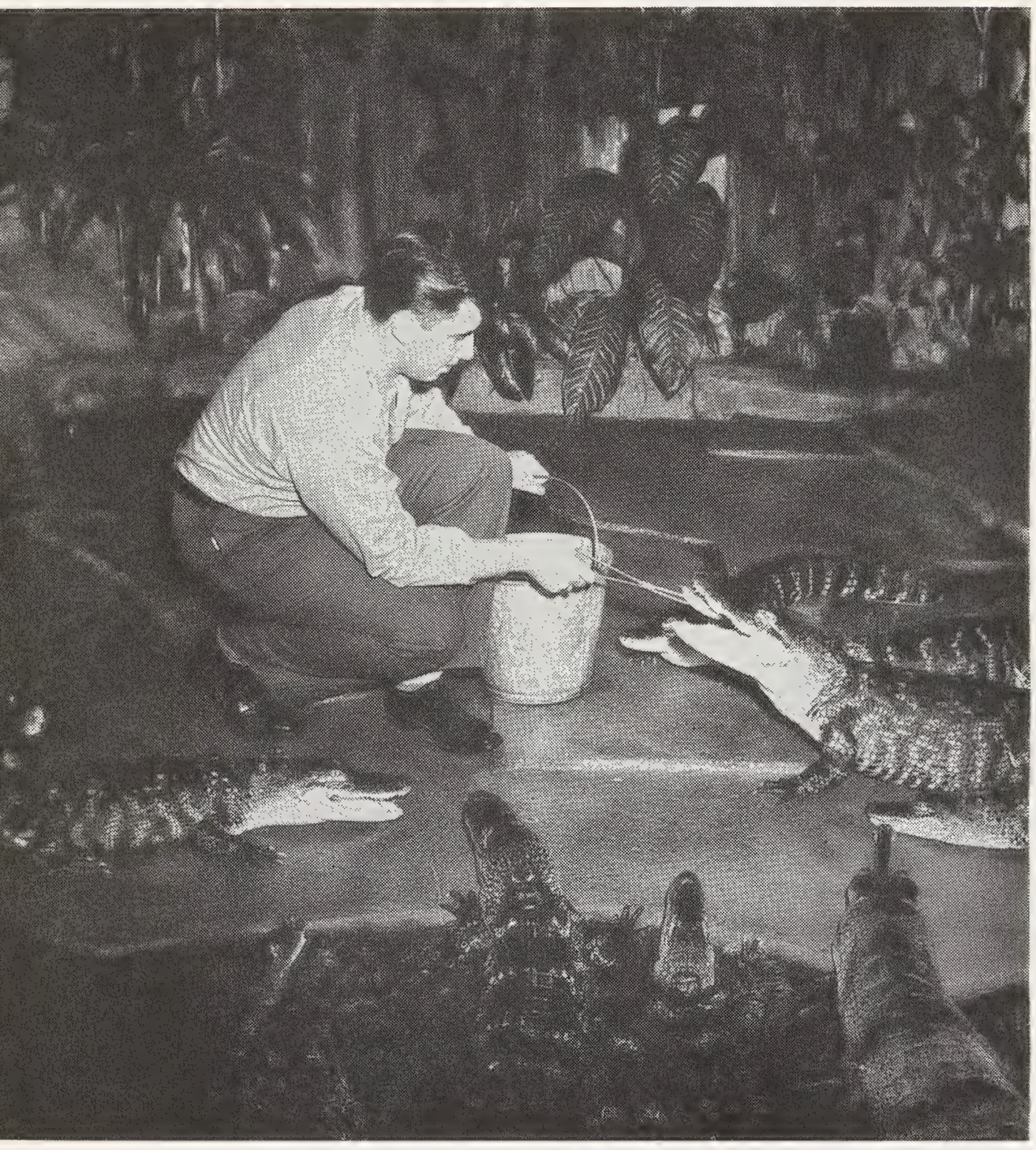
At one time it was difficult to heat the water in the pool and the crocodilians became listless and sometimes refused to feed.

Today temperatures can be kept in the 70s and 80s and feeding is not such a problem; they eat readily and grow at a good rate.

ited Florida in 1773. He reported that in one place, "the alligators were in such incredible numbers, and so close together from shore to shore, that it would have been easy to have walked across on their heads, had the animals been harmless." Neither do they grow as large as they once did; probably they just do not have the opportunity. Although the report of a nineteen-foot monster is admitted to the scientific literature, a fourteen-footer is about the largest to be seen nowadays, and even a twelve-foot animal is a rarity.

The practically non-existent growth of alligators in the older reptile collections led people, and perfectly good biologists among them, to assume that it took many years for an alligator to attain maturity. Estimates of ages ranging into hundreds of years for ten-foot specimens were not uncommon and some of these estimates still survive in roadside shows and tourist traps.

It was left to an "amateur," Mr. E. A. McIlhenny, a man better known for his "Louisiana Hot Sauce," to demonstrate the falsity of such estimates. At his home at Avery Island, Louisiana (Louisiana "islands" are actually hilly areas in the swamp), Mr. McIlhenny had native alligators throughout the surrounding swamp and learned a great deal about them during his youth. Becoming aware of the many misconceptions about alligators in the literature, he obtained eggs from a nest, weighed, measured and marked the newly-hatched young, and released them in a private lake on his property. He captured and measured them at various intervals and finally killed some of them for food studies after they had matured. Others he kept in outdoor enclosures and reared in captivity. By such means



Crocodilians are the most intelligent of the reptiles. Normally nocturnal, our specimens in the Reptile House soon learn to adjust to daytime feeding and food from a forceps.

he was able to show that the animals took no more than ten years to mature and that they were seven to nine feet long at that age.

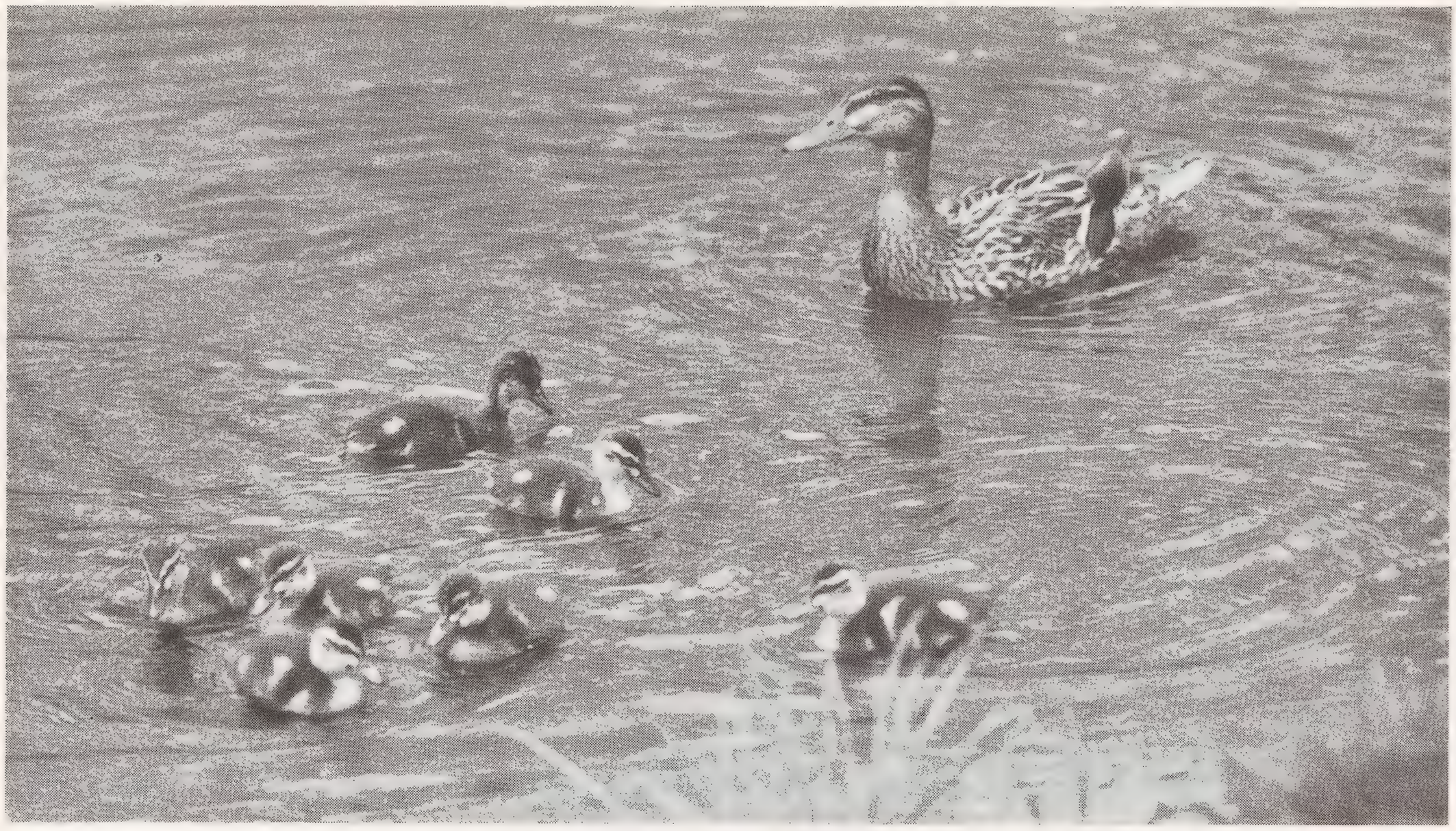
He also pointed out that the rate of growth recorded by Raymond L. Ditmars, the first curator of our Reptile Department, was much less than under natural conditions. The Ditmars rates were recorded in the pre-reconditioned Reptile House, however, and the rate of growth in our collection today is equal to that under good natural conditions. One alligator that arrived in New York as a baby (weighing less than a pound) in 1950, weighed between 20 and 30 pounds in 1954 and now, in 1963, is a huge bull 'gator that exceeds ten feet in length and weighs 514 pounds. His female companion is by no means so big, as befits her sex, but in the same time has attained a length of nine feet and a weight of 347 pounds. During spring thunderstorms, or when rock-blasting is being done in the vicinity, or sometimes just when a large truck passes nearby, the Reptile House resounds with their roars, roars reminiscent of their former homes in the Florida Everglades – or perhaps of Cretaceous swamps never known to man.

Crocodilians, being nocturnal animals, appear a lot more stupid to us diurnal human beings than they actually are. Normally their major activities occur after dark and the daylight hours are spent in sleeping and basking in the sun. Although captive conditions can change this behavior to some degree, they still make rather unresponsive exhibits except at feeding time.

The few critical observations and scientific studies that have been made on their behavior show that they are actually the most intelligent of the reptiles. Their brain structure, though still pea-sized by mammalian standards, also suggests a fairly high degree of sensitivity that is not suggested by their usual statue-like appearance. The late Karl P. Schmidt of the Chicago Natural History Museum was the foremost authority on crocodilians for many years and he had collected many tales of their unusual behavior. The present authority is a German worker, Heinz Wemuth, who, in addition to being a specialist on crocodilian classification, has kept a Spectacled Caiman as a house pet for many years. He claims that it is as intelligent and responsive as the usual family dog.

Dr. Heinz Heck, present Director of the Catskill Game Farm, studied the learning ability of young alligators for his doctoral dissertation at the University of Munich and has an even more impressive story. He found that the young alligators that he reared under controlled conditions could be easily taught the difference between circles, squares and triangles of equal areas, and – even more – could be taught in an equally short time the difference between patterns of horizontal, oblique and vertical lines. What is more, once learned, the lesson was *never forgotten* during the entire period of study!

Remember, then: the stupid-looking, unmoving crocodilians you are likely to see in any Reptile House may merely be sleepy. Their expressions do not change, because they do not have facial muscles. Moreover, it is just possible they may be busy noting *your* size, shape, weight and activity – and estimating how much of a struggle you would put up!



ZOO NEWS IN PICTURES

Photographs by SAM DUNTON

Staff Photographer

Top – Every spring brings a crop of ducklings and goslings, hatched in the Zoological Park's ponds and streams. These Mallard babies are much at home on the Flamingo Pond. Left – This is the first of 5 African Spur-winged Plovers we have artificially hatched this spring, and it may be the first ever hatched in captivity. Four more eggs are in the incubator and the female is sitting on four eggs in the Treetop Exhibit in the Aquatic Bird House.

For the first time in two years we have a Père David Deer fawn — a female born on April 10. The herd, which was started in 1946 when we received two pairs from the Duke of Bedford's estate in England, has prospered and up to now 18 young have been born.

Three young Giant Anteaters are now very much at home in the Animal Nursery in the Children's Zoo. About two months old, they retain their baby gentleness — a trait that disappears as they grow up. Attendants Linda Woghin and Michele Perrault have no difficulty handling them.

Five of the six young Masai Ostriches we received on April 5. At that time they were only about two feet high, but they grow so rapidly that they will certainly be taller than Keeper Pat Clarke by the end of the summer. They may be seen in a new corral south of the new Crane Walk exhibit.

SHARING AN ISLAND HOME

I AM PERHAPS one of the more fortunate naturalists in that my house is situated in the center of a puffin colony on Skomer Island off the coast of Wales. Of all birds, surely the Common Puffin (*Fratercula arctica*) must be the most striking – even amusing – not only in habit, but in appearance as well.

Standing some eight inches high, it has a rather large head and a ponderous bill, which is brightly-colored in red, vermilion and blue-gray during the breeding season. Pure white below, the puffin has silky gray cheeks and a black back. Its legs and feet vary in shade from pale orange to coral red. The sexes, although very much alike, can be distinguished by an experienced observer because the females are slightly smaller and have more slender bills.

A gregarious bird, the puffin is found in colonies – the largest of which may contain over a million pairs – in northwest France, along the coasts of Great Britain and Norway and far north to the rocky fastnesses of Jan Mayen and Novaya Zemlya. Both Iceland and Greenland have large numbers of the birds, and on the eastern seaboard of North America small colonies are found from Labrador southward to Martinicus Rock off the coast of Maine. It has been estimated that the world puffin population is about 15 million pairs.

Top — Skomer Island off the coast of Wales and the house in which the author lives. Right — A few of the 4,000 pairs of puffins that return each year, from March to August, to breed and rear their young.

Top Photo by Fritz Pölking; Right, by G. M. Van Tienhoven

VITH PUFFINS

By D. R. SAUNDERS

Warden, Skomer Island National Nature Reserve, Wales

During mid-March, the first of the Skomer puffins begin to appear for the breeding season, having spent the winter at sea. Perhaps eight months have elapsed since many of them last saw land. Only a few appear offshore at first, then they vanish again. By the end of the month, however, the vast majority has assembled, twinkling in the spring sun as they sit on the sea.

A fine afternoon usually is selected for the first brief landings in which intrepid adventurers make exploratory visits before returning to the sea. Several hours elapse. Then, suddenly, the whole flock starts to wheel in a huge arc around the bay and soon they begin to land. Before long, a ribbon of puffins lines the cliff edges.

The birds are likely to stay about the colony for a few days, then once again disappear at sea for a short period. The process is repeated at irregular intervals until the start of incubation, in which both males and females take part.

During the early days on shore, a great deal of courtship activity takes place as the birds pair for the coming season. The most conspicuous display is that of "billing," during which the birds excitedly rub their bills together. Holding their bills to one side so that the colors are shown to the best advantage, the males slowly approach mates or proposed spouses. If a female is receptive, the two puffins will rapidly shake their bills together. They may stop briefly, but then they commence again with renewed vigor. The billing often attract others who run over, full of curiosity and ready to intervene. As many as six puffins may try to indulge in the activity, while others watch intently, and fighting often results. The spat is usually brief, although I have observed lengthy battles during which the birds roll many yards, even over cliff edges, before they break their fierce embrace.

The birds also display frequently by "head flicking," in which, as one bird watcher said, they seem to have hiccups. This often takes place prior to coition.

Coition occurs mainly at sea (although I have occasionally seen it carried out at the burrow entrance). The male mounts his mate with a whirring of wings, so as to remain in position; the female seems to be pressed down into the water, attempting all the while to keep her head above the surface. To release herself, she often dives – only to reappear a few feet in front of her mate. Then the pair frequently engage in gentle billing.

Both at sea and ashore the puffin is likely to strike human beings as a comical bird. Take-off seems to be particularly hazardous; for the birds

The puffins often use the roof of the house as a good take-off point. Occasionally one topples down the chimney into the rooms below. It is promptly released — sooty but unhurt.

Photo by Fritz Pölking

patter along the surface for many yards before becoming airborne. If the sea is quite calm, many fail to get off the water at the first attempt; instead they come to an undignified halt, after which they are likely to look around with a detached air, as if to say "It wasn't me." If a flock is thrown into a panic by the approach of a boat or the sudden appearance of a seal, the birds scatter wildly in all directions. Many will dive, while a few may even travel in the wrong direction and end up closer than before to the possible source of danger. Once in flight puffins speed along with swiftly-beating wings, criss-crossing the sky above the colony like a swarm of giant gnats.

Coming in to land, too, is fraught with difficulty for the puffins, particularly if strong winds are blowing. They seem to lower themselves down into the wind with legs spread-eagled, their heads turning repeatedly for backward glances. They may repeat the procedure several times before they make a successful landing. Once on land, however, they walk or run with ease, often using whirring wings to assist them in negotiating a steep slope or rock face. With bowed heads, they begin to assemble. They look much like a conclave of busy college professors intent on their business.

Taking off from land is relatively easy for a puffin. One short jump and it is away. To facilitate such departures, most of the birds gather on cliff edges or such suitable eminences as large rocks. At Skomer they soon discovered that the apex of my roof was just such an eminence. As many as sixty birds often perched up there in a long line. Sometimes due to a natural curiosity, or a mistaken belief that they had found a burrow, they toppled down the chimney, emerging sooty but unhurt in my home.

During their early days in the colony, the puffins are busy seeking out and preparing nest sites in rock slopes and burrows other than my chimney. On Skomer, burrows are easy to come by since the soil is soft and sandy and the puffin, with his formidable bill and strong, webbed feet, is a capable excavator.

I have often seen a shower of earth erupting from an old burrow as a puffin repairs the ravages of winter storms. While this is going on, other puffins run many yards to peer with wonder down the hole where the volcano of activity

is taking place. Soon the digger – by now a grubby individual – will emerge and briefly survey the outside world before returning to its subterranean labors. The nest, although little more than a pile of dry vegetation, is quite sizable and is built in a chamber at the end of the burrow. A Norwegian scientist discovered that males gather more material for the nests than do the females.

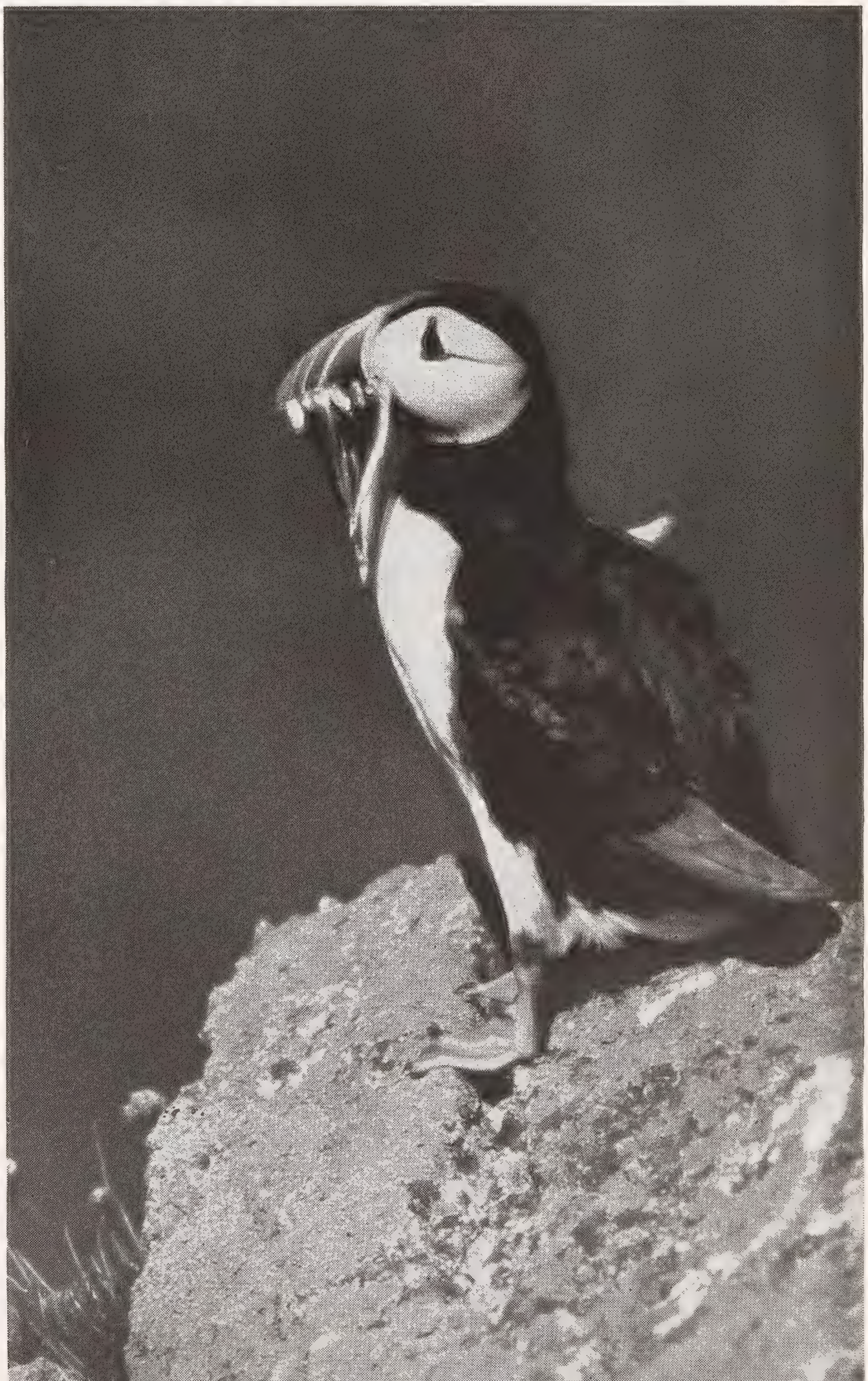
The first eggs are laid usually about the last week of April, although this may be delayed by as much as three weeks by severe weather, such as we had in 1963. One egg is usual, although on rare occasions two may be found in the same burrow. Normally white in color, the eggs are large in comparison to the size of the birds. The incubation period is about forty-two days, with each bird in a pair brooding for continuous stretches that last anywhere from 24 to 70 hours. After first chipping, the chick or "puffling" may take as many as four days to emerge from the shell. The baby bird weighs about fifty grams and is covered with a thick black or dark gray down. Both parents bring it beakloads of fish, usually small whitebait or sand eels. The parents bring several loads, feeding taking place chiefly in the early morning and again in the afternoon. Five or six fish are usually carried at once, although I have seen a single bird carry as many as 14 fish. I never lose interest in watching the bird hold one fish while it catches others.

A double row of backward-pointing serrations in the mandible apparently makes it possible to clutch more than one fish at a time. Although the early naturalists seemed to think the fish were carried tidily head to tail, any watcher at a puffin colony can verify that catch-as-catch-can is more the rule.

The silvery mustache a puffin sports when it is carrying fish is of great attraction to Skomer's predators, such as the herring gull and jackdaw. These fiends quickly spot the homeward-bound puffin and give chase. While the predators rarely come to grips with the fisher, the puffin is often frightened into dropping its load.

But the chicks thrive on what they do get. By the time they are six weeks old, their weight has increased to about three hundred grams. At this point the parents desert the puffling, leaving it to subsist for some 10 or 11 days on its ample fat reserves. By now, the puffling looks like a somewhat grayer version of the adult, although a few tufts of down may adhere to its head like a fluffy crown.

Now the young birds leave the burrow and, traveling at night usually, head for the sea. On occasion, I have met one hurrying intently down a cliff path in broad daylight – certainly a hazardous occupation. Once the birds reach the water, they quickly leave the vicinity of the colony and probably do not return again for several years. The adults also leave at this time; by August, with the exception of a few late nesters, the once densely-populated cliff cities are deserted. Banding has made it clear that the birds



Puffins carry fish in a catch-as-catch-can fashion. A double row of backward-pointing serrations in the mandible apparently makes it possible for a bird to carry up to 14 fish.

Photo by G. M. Van Tienhoven

Adult puffins outside their burrows and a photographer's blind. Puffins use their formidable bills and strong webbed feet to excavate their burrows in the sandy soil of Skomer Island.
Photo by Fritz Pölking

from the British colonies move southward in winter, going as far away even as the Azores and Madeira Islands. Two puffins from the giant St. Kilda colony, for example, crossed the Atlantic during their first winter and were recovered off Newfoundland.

Though the puffin is quite strong and is equipped with a powerful beak – as anyone who has handled one or inadvisedly reached down a burrow probably knows – the bird has a number of enemies.

At one time, man was the chief culprit. Puffins make good eating, and many thousands of the birds were taken annually at such places as St. Kilda, and the Faroes and Westmann Islands. To this day, some are still taken at the latter two localities; the islanders cull only the excess, however, and the colonies have not decreased. It is sad to relate, however, that puffins are decreasing in many other places. For example, the Skomer colony has dwindled in the last 20 years from an estimated 50,000 pairs to some 4,000 pairs.

Oiling at sea may be the chief reason for the staggering decline. It *must* take a tremendous toll of these birds that spend so much time seated idly on the water. All naturalists must hope sincerely that new laws and methods will bring an end to the hazard wrought by the discharge of waste oil at sea.

Too, at the breeding colony, such birds as the peregrine falcon, the buzzard, the raven, the carrion crow, the magpie and various species of gull prey on puffins and their eggs and young. On Skomer, the main enemy is the great black-backed gull, which prowls around the burrows waiting for unwary puffins to emerge.

For some years now, I have attempted to control the numbers of these large gulls. Another potential hazard is the accidental introduction of rats to sea-bird islands. Once-vast assemblies of puffins at such places as Lundy and the Calf of Man have been so depleted by these hazards that only a few birds remain to nest in the most inaccessible cliffs.

When the puffins depart for their lonely Atlantic winter, I feel a deep sense of regret. The summer season seems over, although the first autumn frosts are three months away. As I write this, a winter gale is blasting the island with its unpent fury but I can already picture the calm spring days when the puffins will return to Skomer again.

MINK: The Weasel of the Waterways

Mink, as bred by many for the fur trade, can vary from white or blonde to blue-gray and some furs bear such fanciful trade names as Breath-of-Spring, Ruby-eyed Pastel, Silverblu.

By DAVE MECH

IT WAS MY COMPANION who saw the tracks first. We were crossing a low plank bridge in Isle Royale National Park in Michigan when her sudden exclamation stopped me. The tracks in the rapidly drying mud were ranged two by two. Characteristic: they were Mink tracks.

"Stand still," I whispered. "He might still be here."

Closing my hands like a megaphone, I emitted several high-pitched, extended squeaks and almost immediately a magnificent Mink bounded onto the bridge and loped to within fifteen feet. Stretching his neck and aiming his beady eyes, he stared at us. We stared back. His lustrous brown coat glistened in the sun, and even his white chin patch was evident. It was a male, all right; he was almost two feet long and probably weighed about two pounds — too large for a female.

Unable to contain her excitement any longer, my companion whispered and the spell was broken. The Mink bounded across the bridge and into the underbrush, his back arching in typical mustelid fashion.

What my companion whispered was that the animal reminded her of a big weasel — a natural observation, for the Mink *is* the weasel's closest relative and has the same general characteristics, the high-strung temperament and the reckless habits of its smaller cousin. The main difference between the two is that the Mink has longer and more waterproof fur, partially webbed feet and semi-aquatic habits. Both species are prone to curiosity and share an impulse to investigate anything unusual.

It is easy to call a Mink once you have seen him, but you are fortunate indeed to spot one. Although they occur throughout most of North America, even within large cities, only in a few places are they abundant. They usually frequent streams, rivers, lakes, marshes and other water-

ways, but occasionally individuals forsake their semi-aquatic ways and forage in the uplands like weasels.

Probably part of the reason Mink respond so well to squeaks is that such sounds often mean food. Mice and rats, young squirrels, rabbits and muskrats are among the many kinds of food they eat, and most of these squeak when in trouble. Quite as readily they will take fish, frogs, birds, crayfish, snakes and insects. With few exceptions, Mink do their own killing.

I once watched a caged Mink tackle a house rat not much smaller than himself. With a predator's swiftness and agility, the Mink lunged and locked his jaws in the loose skin on the back of his victim's neck, a rather precarious hold. The rat almost escaped, but the Mink flopped over on his side and dug in with claws and teeth. In a few moments it was all over.

Since Mink frequent areas where Muskrats are common, many people believe that the Muskrat is the Mink's mainstay. However, several studies have shown that they form only a small part of the Mink's diet. A three- or four-pound Muskrat with teeth bared is a formidable opponent, even to a Mink. Dr. Paul L. Errington, who studied Mink-Muskrat relations for 45 years, concluded that Mink take a large number of Muskrats only when some debilitating condition affects the rodents, such as drought, disease or overcrowding.

Further evidence that Mink often find it unwise to attack Muskrats is offered by a New York duck hunter who watched a Muskrat assail a Mink. The Mink was swimming past the end of a hollow log when suddenly the Muskrat shot out of the log and pitched into him. The surprised Mink had all he could do to vacate the vicinity.

On the other hand, there is a record of a Mink inhabiting one chamber of a Muskrat house while a litter of Muskrats occupied the other. There are exceptions to most rules, obviously.

If large and healthy Muskrats are often avoided, rabbits are something else again. A few winters ago I tracked a large male that had killed a rabbit under a stump. The trail led me a quarter of a mile to a hole where the Mink had dragged its prey to dine at leisure.

Like other meat-eaters, Mink may have to travel far in quest of vulnerable prey. They usu-

Mink are seldom found far from water. This adult has the perfect set-up — a den opening under a rock, water only inches away.

Photo by Lynwood M. Chace, OPL

These mink tracks in sand show a double-print pattern made by the hind feet almost registering in the tracks of the forefeet.

Photo by the author

ally investigate the same general locations each time they visit an area, but their routes are highly unpredictable. "A mink is liable to go anywhere, and just as liable not to," are the words of one seasoned trapper quoted by E. T. Seton. In a section of Montana, biologists found that males traveled over areas of up to three miles in diameter, although females had smaller ranges. One female stayed in an area of about 20 acres, and another used a 50-acre area. However, individuals searching for new territories sometimes journeyed more than twenty.

During their travels, Mink probe into log jams, rock piles, Muskrat tunnels and any other nooks or crannies into which they can squeeze their long, lithe bodies. Curiosity must have been particularly well developed in one Mink in South Dakota that explored the interior of a huge federal dam. He swam 1,700 feet through a tunnel, jumped four feet to an inspection platform, then climbed 162 feet up a spiral staircase. Eventually he was discovered, lured into a box-trap and released to continue his wanderings in more natural surroundings.

Mink probably journey farther in winter than in summer, for food is scarcer then. However, their explorations are somewhat hampered by snow and ice. For instance, Mink will enter an unfrozen section of stream, then swim for hundreds of yards under the ice and emerge at the next stretch of open water. It often is hard for Mink to get into and out of ice-locked lakes and marshes. But they are clever animals and there's always a way. Sometimes they drop down the "chimney," or air hole, of a beaver lodge and then enter the water through the beavers' plunge

The long, glossy and waterproof coat of fur that the mink wears has long been sought after by man. Today, because of price reduction, trapping does not take the toll it once did.

Photo by Michigan Conservation Department

hole. More commonly, they bore into a Muskrat house and use the tenants' underwater entrances.

In late February, Mink travel farthest, for it is then that they seek mates. When a male finds a female, the two hole-up and carry on a savage courtship lasting for hours. Then the male abandons his partner and searches out another.

The female carries her unborn young for 42 days. Meanwhile, she lines her den with leaves, grasses and her own belly fur, supplemented with the fur and feathers of her prey. In April, the young — usually numbering four to eight — are born. Their eyes are closed, they are nearly naked and utterly helpless. Their eyes open when they are about five weeks old and at about the same time they are weaned. A few weeks later the family leaves its den. The young accompany their mother on hunting forays throughout the summer, so the family maintains several temporary dens. Early in fall, the young start to stray and soon all family ties are broken. By midwinter the females have reached full size, but the males continue to grow until the following fall.

Already most of them have lived out at least half their lives, for few Mink survive more than three years. No doubt they can live longer, but nature usually does not allow this.

Like all other animals, Mink face a hostile world. Not only must they struggle to earn a living by killing, but they must keep from being killed. Dogs, wolves, foxes, coyotes, bobcats, hawks, owls and eagles are among their natural enemies. Fleas, lice, mites, roundworms, tapeworms and flukes may rob them of their vitality and make them more subject to diseases. Indeed, it is a wonder that any Mink lives until its third birthday.

Add to these wild enemies an army of fur trappers, and it becomes clear why a female must produce four to eight young every year to maintain the species. Trapping today does not take so large a toll as it did 15 years ago, for the price of the world's most popular fur has dropped from about $40 a pelt in 1946 to about $15 at present.

Nevertheless, each winter approximately 300,000 wild Mink are harvested throughout the United States.

The Mink take was much higher than this before World War II. Since then, man has "improved" the wild Mink by breeding several new color variations. "Man-made" Mink come in such curious colors as white, blue-gray and blonde, and with such novel names as Breath-of-Spring, Silverblu and Ruby-eyed Pastel, all created to catch the fancy of today's women. It is an expensive fancy, for full-length Mink coats cost $2,500 to $20,000. Such coats are composed of the well-matched back strips of about eighty Mink. Although stoles, capes and neckpieces require fewer pelts, they are costly in proportion. But the Mink market is never-failing, and some 3,000,000 raw pelts are used annually.

Most of us admit the beauty of Mink furpieces, but those of us lucky enough to have glimpsed a Mink in his natural surroundings are bound to say no Mink coat is so beautiful as when its original owner models it.

News from the Conservation Foundation

Foundation Officers Attend White House Conference

The White House Conference on Natural Beauty and Conservation, May 24 and 25, with Laurance S. Rockefeller as chairman, included a number of the Foundation's officers among several hundred top business, government and conservation leaders. Dr. Edward H. Graham and Dr. Frank Darling represented the Foundation on the "Agriculture and the Landscape" panel. Paul F. Brandwein was chairman of the panel on "Education," Frank Gregg participated in a panel on "The New Suburbia," and Sidney Howe acted as reporter for the panel on "Citizen Participation."

Discussion panels included "City Parks and Space," "Landscape Action," "Design of the Highway," "Scenic Roads and Parkways," "Roadside Control," "Junkyards" and "Reclamation of the Landscape."

Foundation to Continue CORC Program

The Citizens' Committee for the Outdoor Recreation Resources Review Commission Report (CORC), a committee of the American Conservation Association established in 1963 to broaden public understanding of outdoor recreation needs and ways of meeting them, has been merged with the Conservation Foundation.

In a statement, President Samuel H. Ordway, Jr., said: "The Foundation will continue CORC's efforts to develop sound outdoor recreational opportunities for the American people as an integral part of the Foundation's over-all program, on behalf of the quality of man's environment. CORC possesses a distinguished membership of conservation leaders, and the Foundation expects to continue to assist them and cooperating organizations with services and information, including the provision of CORC publications."

Mr. Ordway said that Frank Gregg, formerly Secretary and Executive Director of CORC, is joining the Foundation as Director of its Washington office at 1001 Connecticut Avenue, N.W., and will be assisted by Sidney Howe of Avon, Connecticut, former Director of the Farmington River Watershed Association.

American Film Festival

The 7th Annual American Film Festival was held this year at the Biltmore Hotel in New York from April 21 to 24. This four-day assembly of producers, educators and distributors, the largest and oldest in the non-theatrical motion picture field, attracted more than 700 entries. John Gibbs, Martha Munzer and Noel Eichhorn of the Foundation's staff, assisted by William Bridges of the Society and others, acted as judges in the Natural Resource, Conservation, and Nature and Wildlife categories. Blue Ribbons were awarded by the judges to "Agriculture, Research and You," sponsored by C. Pfizer & Co.; "The Enduring Wilderness," produced by the National Film Board of Canada; and the "Colonial Naturalist," released under the sponsorship of Colonial Williamsburg, Virginia.

Early Returns from Airlie

While it is too early to evaluate the long-range consequences of the recent meeting at Airlie House on "The Future Environments of North America," there have been enough reactions from the more than fifty participants during the four-day conference to warrant considerable optimism and pride in its significance. In the meantime, as was pointed out by Lewis Mumford, the value of the conference will probably bulk larger as time passes and we digest the contents of the 34 papers and the discussions that followed.

A volume containing the papers and a summary of the discussions, edited by F. Fraser Darling, of the Foundation, will be published by the Natural History Press of Doubleday & Company.

Briefly Noted

In the last two weeks of April Dr. William Vogt embarked on a conference and lecture tour

of the mid-Atlantic seaboard. The tour included lectures on human ecology for students and faculty of William and Mary College, a conference with the faculty of the University of North Carolina on the organization of an inter-disciplinary seminar on a population policy for the United States, and a discussion of Tropical Forestry at Duke University . . . Noel Eichhorn attended the annual meeting of the Society of American Geographers in Columbus, Ohio . . . Martha Munzer was the speaker at an assembly on careers in conservation at the Roosevelt High School in Yonkers on May 3 . . . John Milton, aside from his duties as Chief Administrator and Secretary to the Airlie House Conference, attended the first week's meeting of the United States Sub-committee for the International Biological Program to which he had been appointed.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Zoo's Elms Being Injected Against Dutch Disease

In an effort to prevent the spread of the invariably fatal Dutch elm disease to the remaining American elms in the center of the Zoological Park, we are injecting some sixty of them with "Bidrin," a new systemic chemical developed to destroy the European bark beetles that spread the fatal fungus.

More than 550 American elms have died and have been removed from the Park's grounds in the past ten years, and several more will have to be removed from the central area this spring, including one just outside the Rainey Gate.

"Bidrin" was developed by the Shell Chemical Co. and has been tested with some success for the past five years. In March Superintendent of Operations Driscoll and Park Foreman Jungblut attended a seminar and training course in the use of the chemical at the University of Maryland and were given special certificates permitting them to use the substance, which is extremely poisonous. The technique is to inject small quantities of the poison into the sapwood of healthy trees, in a ring at about eye-level; if the cannulas are accurately placed the chemical drains into the sap in one to three minutes, and within 24 hours is carried throughout the tree. It kills the beetles, aphids and cankerworm feeding on the small branches in the crown of the tree.

Arthur Hirt (left) and Robert Jungblut removing Bidrin containers after injecting an elm.

Injections have to be made repeatedly and the technique is not foolproof; a careful estimate has to be made of the capacity of the tree and an over-dose will kill the tree as well as the beetles, while an under-dose is not very effective against the beetles. However, "Bidrin" seems to offer some assurance of saving the elms and Superintendent Driscoll considers it worth trying.

As replacements for dead elms around Baird Court, we are planting pin oaks and honey locusts.

The Electronic Detective and the "Snarley Buzz"

How a minor mystery was solved at the Society's Tropical Research Station in Trinidad is recounted by Director Jocelyn Crane in her latest report on Station activities.

"Five years ago this spring when Donald Griffin brought a bat-detector down to Simla, we felt like King Arthur's courtiers the day the Connecticut Yankee produced the eclipse," Miss Crane wrote. "Now, in 1965, our jet-age instruments still seem an unlikely sight in a jungle laboratory. At latest count, including the gear of guests, we have on the place two bat-detectors, four oscilloscopes, five tape recorders and ten cameras, none of them recommended for amateurs.

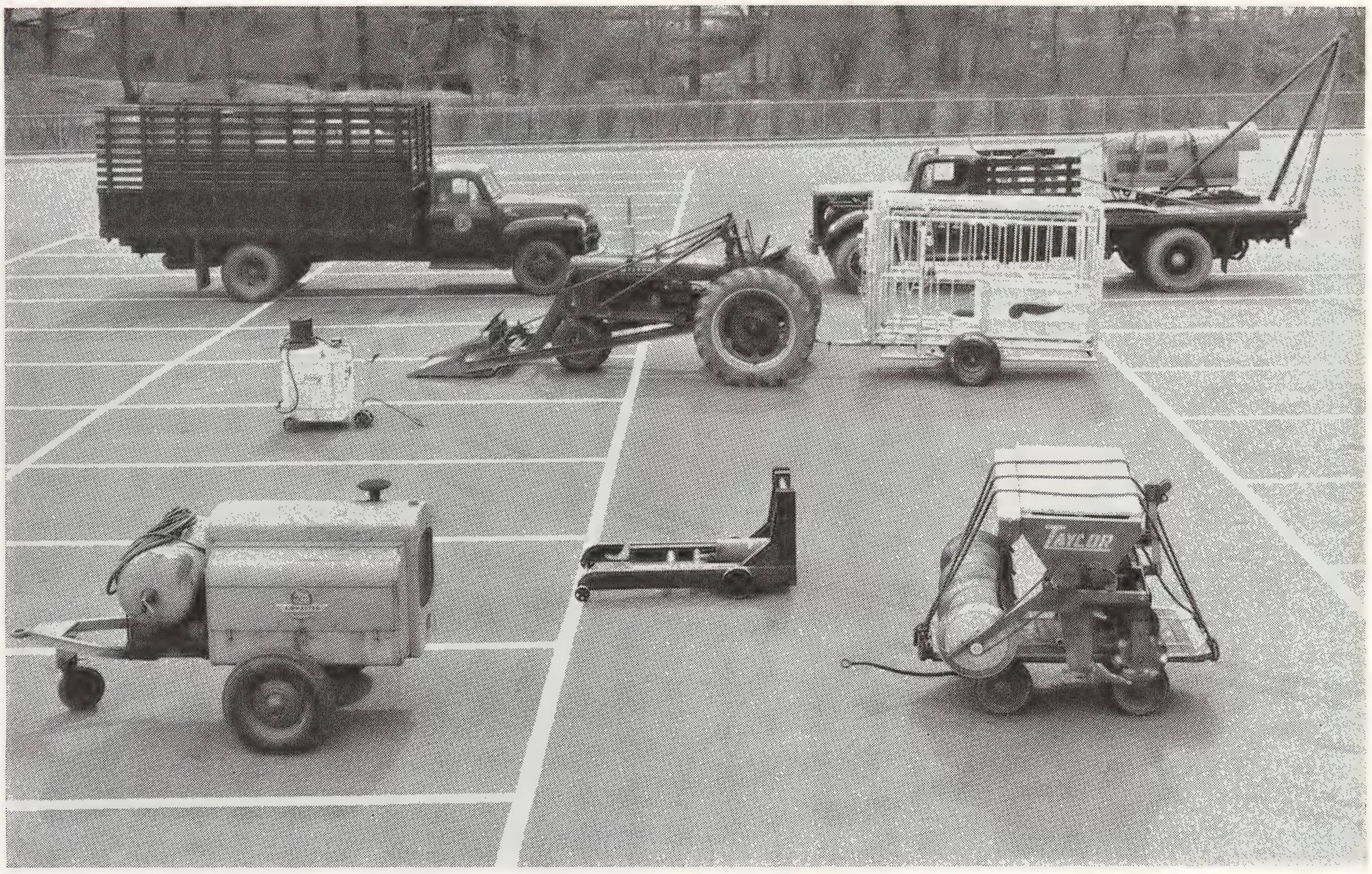
"One recent find needing a special instrument is the Snarley Buzz. For two years the source of this wholly ultrasonic noise has been our favorite Simla mystery. The call occurred only at twilight and only in a particular bougainvillaea on the terrace. Because it is ultrasonic, we could only hunt it with a bat-detector. In spite of many searches, made whenever any bat people were in residence with their instruments, we could never locate the source.

"Then, thanks to Dr. Nobuo Suga from Tokyo and Harvard, we met the Snarley Buzz face to face. As before people had peered into bushes, climbed trees, leaned over terrace walls. Finally Dr. and Mrs. Suga traced the creature to a leaf in our big Pride of India on the south terrace. The mystery turns out to be a midget katydid, pale green and arrow slim, with tissue wings an inch long. Yet through the bat-detector he makes a raucous noise out of keeping with his delicacy. We are hearing, of course, only a rough translation into audible tones of the ultrasonic song which brings the female to his side. Perhaps some day we shall find a way to tune our ears to higher frequencies, rather than pulling all that inaudible music down to merely human range."

Even photographs are sometimes deceptive — for there is only one fish in this picture. It is a Red Grouper at the Aquarium which often approaches the surface with its mouth open. The "top fish" is its image in the undersurface.

Society Will Make Awards for Natural History Program

An award consisting of a week's stay at the Bruce State Conservation Education Camp or a collection of natural history books of equivalent value will be made by the Zoological Society to outstanding students in the Education Department's Natural History Program for Junior High School Students. The outstanding student of the first program was Ladislaw Santiago of 52 East 137th Street, New York City.



James Walter Carter, a Benefactor of the Zoological Society, has presented all the mechanical equipment shown in this picture to the Zoological Park. Originally it was in use at Mr. Carter's Claremont Manor Estate at Claremont, Virginia. It is an important supplement to our own.

Zoo Keepers Are Taking Course in Zoology

From April until July keepers in the animal departments of the Zoological Park are taking a course in general and practical zoology taught by the Director, the Curators, the Veterinarian and the Head Keepers.

The over-all character of the course is practical, with sessions on parasites and diseases, techniques of catching and crating animals, and procedures to encourage breeding. General subjects covered are quarantine and import regulations, the purposes and functions of a zoo and the responsibility of zoos in the conservation of wildlife.

Indian Rock Python Yields Data in Laboratory

Most reptilians take little or no care of their eggs, but the Indian Rock Python coils about her eggs and can raise her body temperature during incubation. This characteristic has been noticed before, but it has not been possible to make many observations of the physiology of the snake. This can now be done in the new metabolism chamber in the Reptile House Laboratory. Earlier in the spring a young Indian Rock Python laid a clutch of eggs and, although they proved to be infertile, she remained curled around them for a full month, during which a research team made temperature readings and measured intake of oxygen and exhalation of CO_2. Analysis of the data should provide much new information about the incubation of pythons and the physiology of snakes.

Summer Research Program for Cornell Students

Six outstanding students of zoology at Cornell University will spend their summer vacation in a combined work-research program in the Zoological Park. The students were selected by the University on the basis of ability. They will devote half their time to menagerie keeper work and the other half to specific research projects selected by the Society. The first year's program is being

financed by the Zoological Society. Two students will be assigned to each of the animal departments – mammals, birds and reptiles.

Steel Tanks for Seals

Three steel tanks have been installed at the Aquarium for the holding, quarantine, acclimation and treatment of seals. They will permit gradual adjustment of newly-acquired animals and are expected to improve the chances of their long-term survival.

IN BRIEF

Staff Appointments. Curator Dowling has been appointed Adjunct Professor of Biology at New York University and Dr. Gandal has been appointed Research Collaborator at the Brookhaven National Laboratory.

Zoo Attendance. There are ninety-some-odd zoological parks in the United States and the combined attendance of all but a few of them in 1964 totalled 75,000,000, according to the American Association of Zoological Parks and Aquariums. This figure does not include several large zoos which failed to report, among them the National Zoo, Cincinnati and Pittsburgh, nor does it include aquariums.

King Cobra Babies? The King Cobras, which have not laid eggs and produced young since 1957, mated in April and there is a good possibility that we will again have cobralets early in the summer.

Bamboo Uncertainty. Clumps of bamboo growing in large wooden boxes on the floor of the Main Bird House led exemplary vegetable lives for many years; they grew steadily and gracefully and caused nobody any trouble. Last fall we moved them to the new Aquatic Bird House, installing one clump in the Swamp exhibit and another in the Marsh. This spring the clump in the Swamp suddenly and inexplicably cast seeds which showered the rich soil at the base of the clump and began to grow like tiny stalks of grass. This would be of no concern, except for the fact that some species of bamboo die back after seeding – and this particular clump is very important to the decoration of the exhibit. However, we are not certain whether this is one of the die-back species and are not prepared to be discouraged until it is identified – a difficult business.

The New Flamingo. The old Flamingo Terrace Restaurant, formerly organized so that customers had to purchase luncheon checks before going to the counter, has been modernized and simplified. The menu consists of a few standard items, including hot and cold sandwiches and desserts, customers pay when served, and the service is much quicker.

Job for Mr. Conway. Director William Conway has been reelected president of the Wild Animal Propagation Trust, an organization of American zoological parks which seeks to pool animal resources for breeding purposes.

Seal Study Chamber. The one-man underwater chamber that can be lowered beneath the ice and which was used in Antarctica last fall by Curator Ray of the Aquarium and his associates, while studying the Weddell Seal, was featured in the April issue of *Bio-Science*.

"Champion Zoologists." Twelve pieces of zoo material – skins, skulls, feathers, nests, teeth and the like – were exhibited in the Bowling Green Schools at Westbury, L. I. and aroused so much interest that a similar collection will be offered to other school libraries in the New York area. The exhibit was made at the request of Mrs. Minna Kirchner, the school librarian, who displayed the objects without identifying labels and offered a certificate of "Champion Zoologists" to the class able to name the most of them. Some 800 children in the fourth, fifth and sixth grades were eligible to compete for the certificate and they made good use of the library's reference books. A class taught by Miss Irene Cederle was the winner, with correct identifications of seven of the twelve objects. Not surprisingly, nobody was able to identify the skin of a Potto.

PUBLICATIONS OF INTEREST

THE WORLD OF THE TIGER. By Richard Perry. 261 pp., photographs. Atheneum, New York, 1965. $6.95.

Until now it has been hard to find a natural history of the Tiger – a surprising thing, for there is certainly no lack of books about tracking and shooting Tigers. Mr. Perry has earned our thanks by searching the literature and producing this well-rounded portrait of a great cat.

THE ENORMOUS ZOO: A Profile of the Uganda National Parks. By Colin Willock. 210 pp., photographs, maps. Harcourt, Brace & World, New York, 1965. $5.95.

Mr. Willock went to Uganda first in 1961 to film the capture of White Rhinoceroses for Anglia Television. Impressed with the Queen Elizabeth and Murchison Falls Parks, he now writes of their creation, research and game management, and the men who are racing time to solve problems so they can pass sound policies to the new administration when the inevitable Africanization comes.

BUDONGO: An African Forest and Its Chimpanzees. By Vernon Reynolds. 253 pp., photographs, maps. The Natural History Press, Garden City, 1965. $4.95.

An unpretentious and very readable report on the 8 months the author and his wife spent studying Chimpanzees in the Budongo forest of Uganda. More, perhaps, about people and the forest and other animals than about Chimpanzees, but the observations and generalizations about the latter are well-chosen for interest.

MEET THE SOUTHWEST DESERTS. By Philip Welles. 82 pp., 104 photographs by Marvin H. Frost, Sr., 16 drawings. Revised 2nd Ed. Dale Stuart King, Six Shooter Gulch, Tucson, Ariz., 1964. Cloth, $3.00; paper, $1.50.

A useful illustrated introduction to plants, mammals, birds, reptiles and insects of the Southwest deserts. Descriptions are brief but probably sufficient for the casual tourist; a bibliography of more extensive works is given.

JOURNEY TO THE JADE SEA. By John Hillaby. 234 pp., photographs, end-paper map. Simon and Shuster, New York, 1965. $5.50.

John Hillaby's occasional dispatches to the *New York Times* on scientific developments abroad give no hint of the humor and easy narrative flow of this account of his 1,100-mile walking trip to and part-way around Lake Rudolph in Kenya. Afield for the first time completely on his own, many things went wrong and he has no hesitation in telling about his own part in them. The result is that the reader shares his tribulations and joys and takes every step of the journey beside him—laughing most of the way.

ALL ABOUT ELEPHANTS. By Carl Burger. 23 drawings by the author; 23 photographs. 132 pp. Random House, New York, 1965. $1.95.

Intended for ages 10 to 15, this is a happy blend of story-telling about wild, working, and show elephants, and straight natural history. It creates sympathy and understanding, makes a strong plea for conservation, and offers a brief bibliography of popular and more advanced books. A good book to put into the hands of a young zoologist.

THE PRIMATES. By Sarel Eimerl, Irven DeVore and the Editors of *Life*. 200 pp., 72 pp. in color. Life Nature Library, Time, Inc., New York, 1965. $3.95.

Relying heavily on late—and continuing—field studies of the social behavior of the primates, this volume in the Life Nature Library series is likely to contain much that is new to the general reader. The illustrations are superb.

CHARLES DARWIN: A Scientific Biography. By Sir Gavin de Beer. 295 pp., photographs and drawings. The Natural History Library, Doubleday Anchor Books, Garden City, N. Y., 1965. Paperback; $1.45.

A paperback reprint of a biography by the former Director of the Natural History Department of the British Museum. Emphasis is upon the scientific achievements of Darwin's life, rather than the personal aspects.

THE SEAL SUMMER. By Nina Warner Hooke. 160 pp., 34 photographs. Harcourt, Brace & World, New York, 1965. $3.95.

A young male Gray Seal came into Chapman's Pool on the south Dorset coast of England in the spring of 1961, stayed around all summer, and had extraordinarily friendly relations with local people and summer visitors. This might be the recipe for just another seal story, but Miss Hooke has made it a delightful idyll without ever going overboard. Or, if she does, you can't help going overboard with her!

Three Inexpensive Reprints

WILD ANIMALS IN CAPTIVITY. An Outline of the Biology of Zoological Gardens. By H. Hediger. 207 pp., photographs, drawings. Dover Publications, New York, 1964. Paperback, $1.75.

THE PUMA: Mysterious American Cat. By Stanley P. Young & Edward A. Goldman. 358 pp., photographs. Dover Publications, New York, 1964. Paperback, $2.25.

THE WOLVES OF NORTH AMERICA. By Stanley P. Young & Edward A. Goldman. Part I, 385 pp., photographs, maps; Part II, 248 pp., photographs, maps. Dover Publications, New York, 1964. Paperback, each volume $2.00.

Any established zoological library is likely to contain these three books, for each is a substantial contribution that the working zoologist needs. Since 1950 when Dr. Hediger's stimulating book appeared in English, 1946 when "The Puma" was first published, and 1944 when "The Wolves" came out, many young naturalists have come upon the scene. This series of offset reprints, only slightly reduced in page size and with the plates quite satisfactorily reproduced, will fit their libraries and their budgets at the same time. While the books are technically "paperbacks," the bindings are tough and durable.

New Members of the New York Zoological Society

(Between March 1 and April 30, 1965)

Founder in Perpetuity
William Wyckoff Smith

Patron
Donald D. Dodge
W. Wilson Holden

Life
Arthur Godfrey
David T. Schiff

Supporting
Mrs. Robert P. Anderson
Dr. William A. Liebler
Ross Banks MacDonald
Frederick Morgan
George S. Piper
Mrs. Isabel Kellers Tozzer

Contributing
Robert Adler
Robert Bach
Robert L. Bachner
Mrs. Robert B. Baird
Claude Beckham
Mrs. John Bleibtreu
Mrs. Edward H. R. Blitzer
William B. Buhlman
William H. Burkhart
Miss Margaret T. Carvin
Mrs. John Converse
Mrs. John Alden Cook
Miss Edith W. Corning
Daniel Cowin
Mrs. James J. Davis
Mrs. Elizabeth Harriett Drew
Philip N. Dumbrille
P H. Evanson
Maxwell Evarts
Mrs. Maxwell Evarts
Mrs. A. A. Garthwaite
Mrs. Charles Gay
Dr. Evelyn Gaynor
M. A. Gilmartin, Jr.
David H. Griffin
Miss Ann B. Harris
Mrs. H. Nugent Head
Mrs. M. M. Hight
Oliver Iselin, Jr.
Kenneth Appleton Ives
Charles Jockwig
Mrs. George T. Johnson
Dr. Abram Kanof
Francis Leonard Kellogg
Martin F. Kennedy
Miss Elizabeth Kerr
Russ Kinne
Mrs. Percy Knauth
Mrs. Arthur J. Korte
Bruce A. Lages
Charles L. Livingston, Jr.
Alfred T. Mahan
B. Franklin Manierre

Dr. Peter M. Masley
Mrs. Bertha B. McCormick
Mrs. Thomas J. Megear
Mrs. L. Thomas Melly
Mrs. Robert G. Merrill
John J. Messmann
Mrs. Paul L. Miller
Robert H. Minton
Walter Moses
Harry E. Muecke
Miss Elizabeth Muller
Mrs. Henry H. Newell
Samuel P. Peabody
Mrs. Edward Pulling
Mrs. John J. Reed
Samuel Pryor Reed
Mrs. Anthony W. Roberts
Mrs. Thomas C. Roberts
Mrs. Felix G. Rohatyn
Sydney W. Roos
P. James Roosevelt
Hyman Rotkin
Mrs. Leonard T. Salmon
Morton F. Salomon
Rudolph J. Schaefer
Mrs. Albert B. Schultz
Dr. Raanan Smelin
Mrs. Roy H. Steyer
Miss Enid L. Storm
Mrs. Gerard Swope, Jr.
A. Robert Towbin
Mrs. Edward N. Townsend, Jr.
Mrs. Ferrari P. Ward
Mrs. Frank B. Washburn
Mrs. Peter Weil
Richard H. Weiss
Hon. John Campbell White
Mrs. George Whitney

Annual

Miss Patricia Abbott
Miss Adrienne Abseck
Mrs. Marilyn Claire Achard
Jerome H. Adler
Mrs. Robert H. Alexander
Stanley A. Alt
Miss Barbara F. Ames
Mrs. Max Amper
Peter F. Ancona
Antonio A. Andretta
W. Earle Andrews
Marvin L. Arons
Mrs. William H. Auerbach
Mrs. Milton Avery
Mrs. Jacob Baker
Robert Barbanell
Mrs. Philip Barbash
Willem Bartelsman
Mrs. Robert Benenson
Miss Evelyn Berger
Roy Berke
Frans J. Berkhout
Robert S. Berlin
Dr. Theodore Besdine
Suchit Bhinyoying
Dr. Bradley Bigelow
Mrs. Jane B. Boltz
Fred B. Bosworth
Edmund A. Bowles
Robert M. Bradbury, Jr.
Dr. Richard J. Bridgman
Henry F. Brzezinski
Mrs. Adele Buckalter
Miss Ada Julia Buckley
Miss Alice Dacre Butterfield
Miss Ethna V. Carroll
Mrs. Patricia G. Carll
Mrs. David B. Chase
Mrs. Alexander Chernak
Hayward Cirker
Dr. Donald A. Clarke
Robert Coffman
Mrs. Hugh G. Collins
Kent G. Colwell
Mrs. W. Commens
William Bolton Cook

Miss Olive E. Coomes
Mrs. Louise H. Hubbard
Miss Cara A. Cooper
Walter W. Cooper
Richard D. Cordes
Mrs. George F. Corring, Jr.
Mrs. David M. Crawford
Mrs. Ralston Crawford
Mrs. Benjamin E. Crispin
Mrs. Frank L. Crocker
Mrs. Dorothy Crockett
Mrs. Joseph F. Cullman, 3rd
Dr. Brian J. Curtin
H. P. Curtis
Robert F. Cuneo
Mrs. William D. Dana, Jr.
Richard B. Davis
Hugh M. Dean
William Y. Dear, Jr.
Mrs. Andre DeB. DeCoizart
Tadeus Dejewski
Salvatore P. De Milia
Miss Helen Dieschbourg
Arnold Dinowitz
W. S. Dodds
George W. Dohmann
Miss Shirley F. Doll
Edward J. Donnelly
E. S. Drake
Jacob A. Edelman
Mrs. Chester M. Edelmann, Jr.
Roy Eidman
Miss Susan M. Eilenberg
Edouard C. Emmet
Theodore H. Engel
Mrs. Josiah M. Erickson
James A. Farley
Miss Violette C. Faure
Albert Feininger
Mrs. Louis Ferguson
David C. Ferner
Oliver D. Filley, Jr.
Mrs. Nevil Ford
Louis Forer
Mrs. Barbara Ann Foster
Melvin D. Freidel
S. K. Friedman
Mrs. David S. Froehlich
Mrs. C. Gaines
Bruce B. Gamble
Mrs. Joseph H. Gardner
Lloyd K. Garrison
Mrs. Lloyd K. Garrison
Mrs. Carol B. Gartner
Richard L. Garwin
Allan J. Gascoigne
Mrs. Thomas R. George
Benjamin Gilbert
Miss Mary S. Gilbertson
Mrs. Grace Ginsberg
Miss Liz Nan Glasgow
Mrs. Jeffrey Glen
Mrs. David L. Globus
Leo F. Goeller, Jr.
Miss Beverly Goldey
Joseph A. Green
Mrs. Edward Greenbaum
Mrs. Bernard L. Greenspan
Leveritt Sage Gridley
Mrs. Corinne Guiffre
Jeremiah S. Gutman
Francis E. Haase
Mrs. Theodore P. Halperin
Walter J. Handelman
Jack Hanson
Mrs. Leonard B. Harmon
James A. Harper
George W. Hatfield
Miss Elizabeth Haynes
Fritz F. Heimann
Dr. Louis M. Hellman
George A. Herring
Stanley J. Hertzig
Edwin H. Herzog
G. Hiden
Mrs. Harry H. Hill
Bruce Hogg

Frank Hollander
Miss Muriel O. Horne
Mrs. Anthony Immarco
Major Charles J. Irwin, Jr.
Robert J. Janoff
Mrs. Alfred L. Jaros
Dr. Burton M. Jerome
Harry Jiler
Louis Paul Jonas
Mrs. Sidney Kaufman
Mrs. Elizabeth G. Kaye
Miss Norma Kendall
Walter H. Kilham, Jr.
Gerhard Kindler
Mrs. P. T. Kirschke
Mrs. Herbert J. Kleiman
George M. Knebel
Miss Alice E. Koch
Walter Koepcke
Mrs. Kay Koopman
Dr. Arthur Koppen
Sol Kornbluh
Lawrence H. Kramer
Dr. Norman Krasnow
Miss Marilyn Krisberg
Robert A. Kulka
Eric S. Langfier
Dr. Ira J. Laufer
Blake L. Lawrence
Dr. William M. Layton, Jr.
Joseph F. Leanza
Miss Alice M. Le Veen
Herbert D. Levine
Dr. Joseph Levine
Marvin K. Levinson
Bernard Levitz
Mrs. Henry P. Levy
Dr. Lester N. Levy
Peter A. Loeb
Frederick R. Loney, Jr.
J. Douglas Lunan
Lyman T. Lundeen
Dr. Sidney M. Lytton
Mrs. N. J. Macdonald
Mrs. Robert C. MacIntyre
Norman M. Maier
Mrs. Guillermo Maldonado
Mrs. Peter L. Malkin
Miss Harriett Marple
Edward C. Mattes
Miss Irene W. Mayers
David B. McCall, Jr.
Miss Sarah H. McLean
William H. Menges
Mrs. Helga M. Merryman
Mrs. Bettie Messmann
Mrs. R. A. Michaels
Mrs. Barry Miller
Miss Sally A. Miller
Mrs. Leonard Mindich
Lewis S. Morganstern
Robert M. Morgenthau
Mrs. Grinnell Morris
Dr. Equinn W. Munnell
Esmond K. Murphy
Joseph N. Muzio
Richard H. Nass
Hal K. Negbaur
J. Neuwirth
B. Douglas Newton
Elmer V. Newton
Thomas L. Norager
Rev. Arthur E. Norton
James P. O'Keeffe
Harold H. Oppenheimer
J. Lester Parsons, Jr.
Mrs. Kenneth H. Paton
Frederick R. Peake
Mrs. Albert Pezzati
Jack L. Pfeiffer
William B. Phillips
Val E. Pochay
Mrs. Robert Watson Pomeroy, Jr.
Mrs. Ralph B. Pomery
Mrs. Thomas Harris Powers
Mrs. Lewis T. Preston
Dr. Lillian J. Proietto

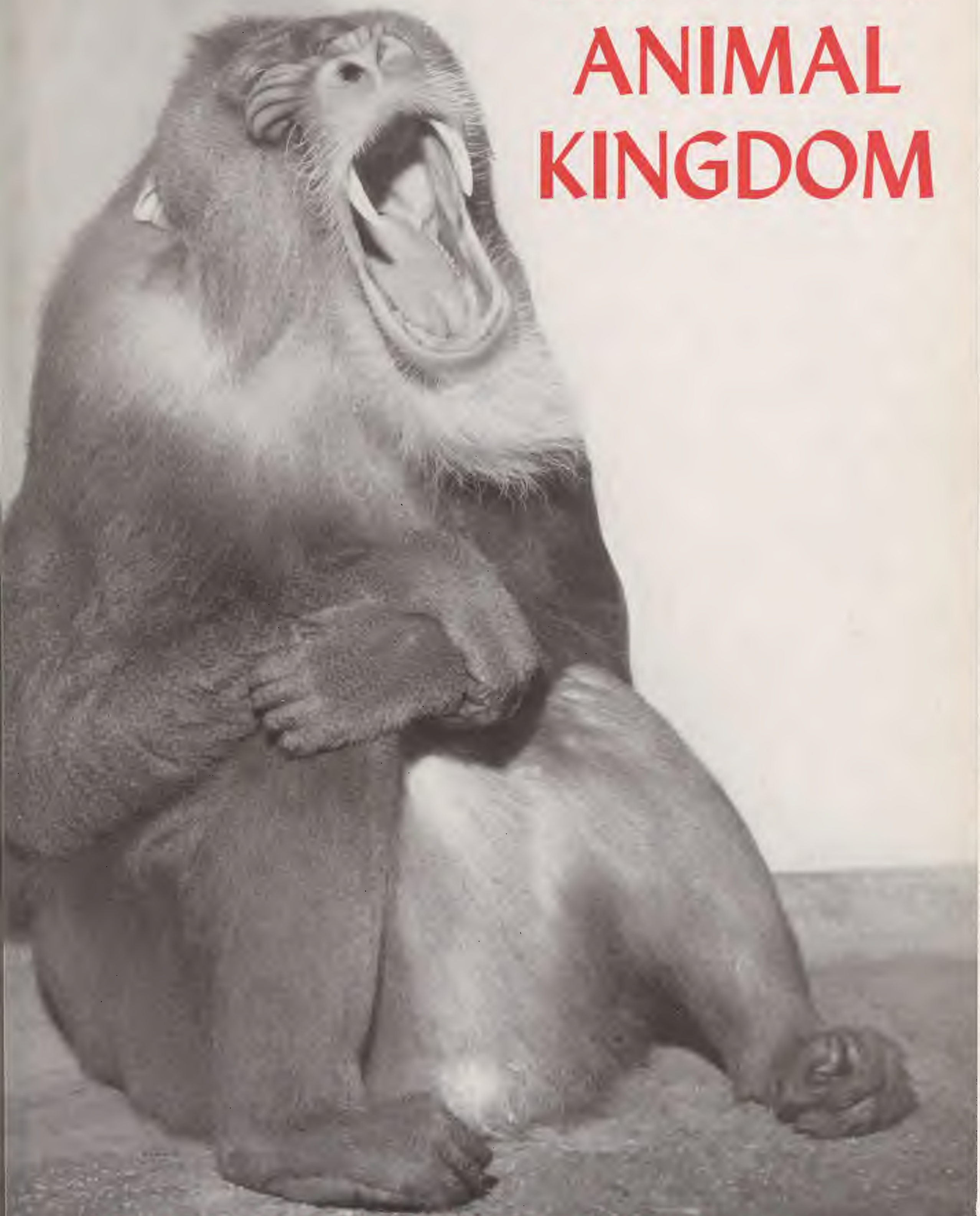
Dr. Wilfred Quaytman
Morris Radmin
Harry Achir Raff
Irvin Raffman
Mrs. Marc Ramniceanu
Gilbert Reichel
Mrs. Muriel Reiffe
Mrs. Ernest Reinhard
Mrs. Edward Renouf
Dr. Peter Cyrus Rizzo, III
Melvin Lloyd Robbins
Robert N. Robbins
Dr. Dudley F. Rochester
Mrs. Stanley C. Rockwell
Middleton Rose
Herbert S. Rosen
Mrs. Bernard Rosenberg
Robert Rosenman
Mrs. Walter N. Rothschild, Jr.
Mrs. Robert W. Rowen
Miss Vere L. Rubel
S. G. Ruderman
Mrs. David W. Safford
Mrs. Nathaniel Samuels
Robert W. Sanders
Joseph Sartori
Quentin Schaffer
Jerome Scheps
Mrs. Hilda Shevack Schlaifer
Dr. Arthur A. Schon
Dr. Julian B. Schorr
Robert Schwabacher
Morris Schwartz
Mrs. Edward R. Schwartz
George R. Schwarz
Arthur N. Seiff
Henry B. Sell
Mrs. H. Cecil Sharp
Charles L. Sherman
Mrs. K. H. Shotwell
Miss Gene Marie Sinclair
Mrs. Milton H. Sisselman
Miss Marcia Carol Sobel
Walter L. Solomon
Miss Judith Stein
Robert H. Sternberg
Dr. Paul Stone
Lawrence Paul Straub
William Swatton
Philip Tager
Neal M. Teitler
Mrs. Clark Thompson
Michael C. Ticknor
Thomas E. Tisza
Bernard Tobacman
Miss Helene F. Torres
Frank Towber
Mrs. Harold Triestman
Mrs. Ruth Troscianiec
Steven Tucker
Mrs. N. George Turchin
Miss Louise Van Vliet
Miss Jean Volkmer
Robert Walderman
Curtis K. Wall
Mrs. Dorsha Wallman
Henry Ramsay Warner
Mrs. Wolcott M. Warner
Mrs. Morris Wynn Watkins
Louis M. Weber
Mrs. Merrill Weiler
Dr. I. Weinberg
Morris Weinstein
Mrs. Jeanne Weiskopf
Irving Z. Weisman
Robert E. Weiss
Miss Caroline Wertheimer
Mrs. Edward C. R. Whitcraft
Miss Joyce R. Wilson
Mrs. Virginia Wilson
Mrs. David Winter
Rudy Wittenberg
Mrs. Donald Wood
Mrs. Marilyn Wooton
Robert G. Zeller
Dr. Philip Zuckerman
Raymond F. Zwigard

NEW YORK ZOOLOGICAL SOCIETY
FOUNDED 1895

JUN 4 966
Library
Patuxent Wildlife Research Center

VOL. LXVIII • No. 4 • JULY-AUG., 1965

ANIMAL KINGDOM



THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

NEW YORK ZOOLOGICAL SOCIETY

General Offices: 630 Fifth Avenue, New York, N. Y. 10020

PRESIDENT	*VICE-PRESIDENT*	*SECRETARY*	*TREASURER*	*ASSISTANT TREASURER*
Fairfield Osborn	Laurance S. Rockefeller	John Elliott	David Hunter McAlpin	Eben Pyne

EXECUTIVE COMMITTEE

Laurance S. Rockefeller
Chairman
George F. Baker, Jr.
John Elliott
Henry Clay Frick
Peter Gimbel
Robert G. Goelet
John N. Irwin, II
David Hunter McAlpin
Fairfield Osborn
John Pierrepont

BOARD OF TRUSTEES

Class of 1966
Robert E. Blum
William R. Coe
C. Suydam Cutting
Henry Clay Frick
Anthony D. Marshall
Otto Marx, Jr.
David Hunter McAlpin
G. W. Merck
Augustus G. Paine, II
Richard C. Patterson, Jr.
John H. Phipps
Alfred G. Vanderbilt

Class of 1967
Alexander Aldrich
George F. Baker, Jr.
John Elliott
Robert I. Gannon
Peter Grimm
Fairfield Osborn
Eben Pyne
Laurance S. Rockefeller
John M. Schiff
Henry Sears
Joseph A. Thomas
Robert Winthrop

Class of 1968
Charles W. Engelhard
Peter Gimbel
Robert G. Goelet
John N. Irwin, II
Warren Kinney
Peter N. Matthiessen
Howard Phipps, Jr.
John Pierrepont
David T. Schiff
Chauncey Stillman
Landon K. Thorne, Jr.

Ex-Officio:
The Mayor of the City of New York, Hon. Robert F. Wagner
The Commissioner of Parks, Hon. Newbold Morris

STAFF: Zoological Park, Aquarium & Other Society Activities

William G. Conway . . . . *Director, Zoological Park*
Paul Montreuil . . . . . *Director, Aquarium*
John Tee-Van . . . . . *General Director Emeritus*
Christopher W. Coates . *Director Emeritus, Aquarium*

ZOOLOGICAL PARK

Joseph A. Davis, Jr. . . . . *Curator, Mammals*
H. Bradford House . . . *Assistant Curator, Mammals*
Grace Davall . . *Assistant Curator, Mammals & Birds*
Roland Lindemann . . . . . *Consultant in Mammal Management*
William G. Conway . . . . . *Curator, Birds*
Joseph Bell . . . . . *Assistant Curator, Birds*
Herndon G. Dowling . . . . . *Curator, Reptiles*
Victor H. Hutchison . *Research Associate in Herpetology*
Allen Vinegar . *Visiting Research Fellow, Herpetology*
Charles P. Gandal . . . . . *Veterinarian*
Gordon Cuyler . . . . . *Membership Chairman & Administrative Associate*
Herbert J. Knobloch . . . . . *Curator, Education*
Jerry M. Johnson . . . *Designer, Dept. of Exhibition*
Charles B. Driscoll . . . *Superintendent, Operations*
Edward Kearney . . . . *Manager, Facilities Dept.*
Lee S. Crandall . . . . *General Curator Emeritus & Zoological Park Consultant*

AQUARIUM

Carleton Ray . . . . . *Curator*
Joseph Geraci . . . . . *Associate Curator*
Ross F. Nigrelli . *Director of Research and Pathologist*
Klaus D. Kallman . . . . . *Geneticist*
Jewell Bungay . . . . . *Business Manager*
Aage Olsen . . . . . *Superintendent*
Morris H. Baslow . . *Research Associate in Physiology*
C. M. Breder, Jr. . *Research Associate in Ichthyology*
Harry A. Charipper . . *Research Associate in Histology*
Sophie Jakowska . . . . . *Research Associate in Experimental Biology*
Louis Mowbray . . *Research Associate in Field Biology*
Martin F. Stempien, Jr. . . . . *Research Associate in Bio-Organic Chemistry*

GENERAL

Walter Lerchenfeld . . . . . *Comptroller*
Harold C. Palmer . . . . . *Assistant Secretary*
John J. McKew . . *Personnel Manager & Assistant to the Director, Zoological Park*
William Bridges . . . . . *Curator, Publications*
Dorothy Reville . . . . . *Editorial Assistant*
Sam Dunton . . . . . *Photographer*
Henry M. Lester . . . . . *Photographic Consultant*
William H. Eddy, Jr. . . . . *Associate in Education*

DEPARTMENT OF TROPICAL RESEARCH

Jocelyn Crane . . . . . *Director*
Michael G. Emsley . . . . . *Assistant Director*

Associates

Jane Van Z. Brower
Lincoln P. Brower
William G. Conway
Julie C. Emsley
William K. Gregory
Donald R. Griffin
David W. Snow
John Tee-Van

AFFILIATE

L. Floyd Clarke, *Director*
Jackson Hole Biological Research Station

CONSERVATION FOUNDATION

Wallace D. Bowman
Paul Brandwein
George E. Brewer, Jr.
F. Fraser Darling
Noel D. Eichhorn
John C. Gibbs
John P. Milton
Martha Munzer
Samuel H. Ordway, Jr.
William Vogt

AFFILIATE

Richard A. Cooley, *Director*
Alaska Research Station, Juneau

ANIMAL KINGDOM

Bulletin of the
New York
Zoological Society

In This Issue

Mandrill: The Old Man Shows His Teeth
Sam Dunton **Cover**

Four Baby Gorillas — Four Personalities
Charles P. Gandal **98**

Spotted Skunks Make Interesting Neighbors
Frank F. Gander **104**

It's Easy to Take Good Photos of Animals in the Zoo!
Sylvia C. Bergel **109**

The Penguin Metropolis of Punta Tombo
William G. Conway **115**

Behind the Scenes **124**

Vol. LXVIII AUGUST 1965 No. 4

Issued bi-monthly by the New York Zoological Society at the New York Zoological Park, Bronx Park, Bronx, N. Y. 10460. Editorial and Subscription Offices at the same address. Title registered with United States Patent Office • Subscription, $3.50 a year; single copy, 60 cents. Same rates for all foreign countries and Canada. Second-class postage paid at Bronx, N. Y. Send Form 3579 to Bronx, N. Y. 10460.

The Symbol and Its Meaning

A BUILDING can be a symbol – not merely a physical mass. Most buildings are solely the latter – places in which to store things, goods or machinery, or to house people, generally in crowded numbers, who, in turn, must seek the purpose of their lives outside the confines in which they live.

But there are vivid exceptions – places that bespeak vital purposes and serve as centers for creative activities.

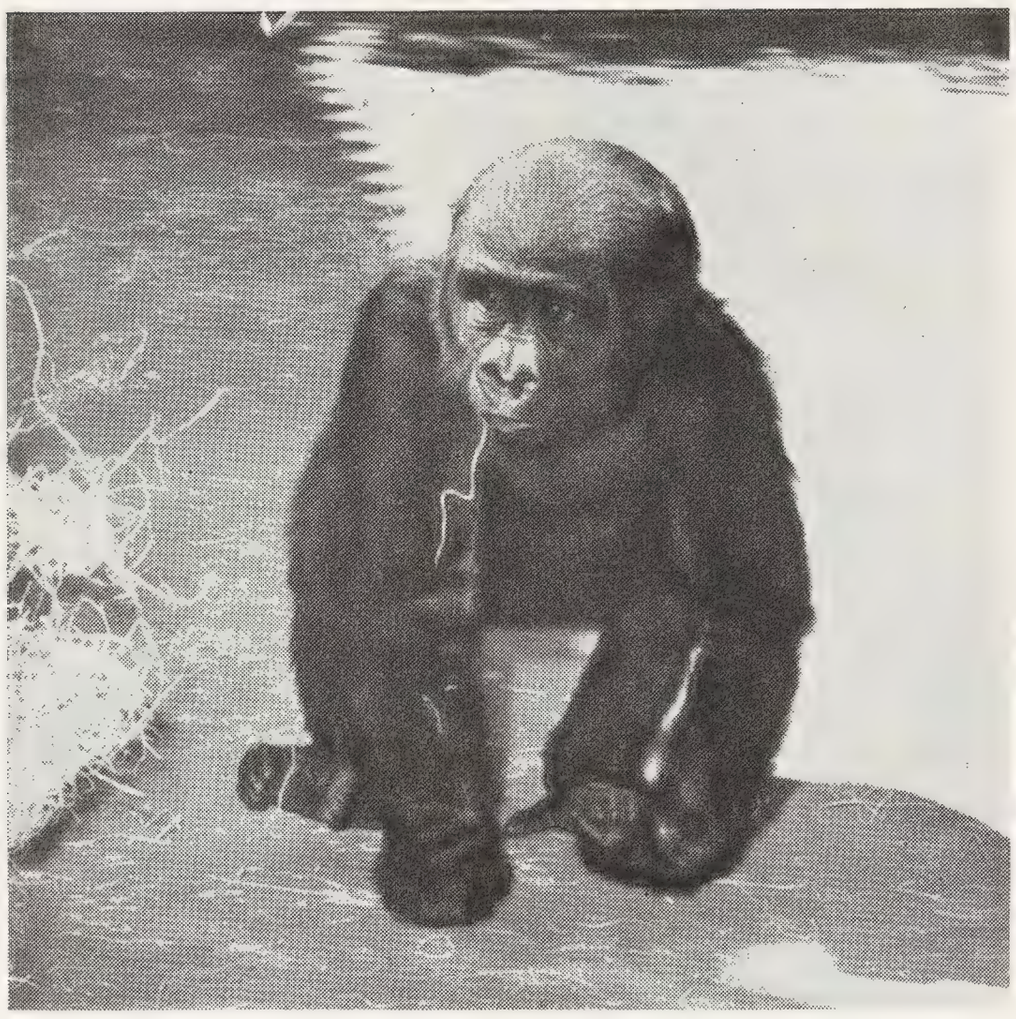
The new Laboratory of Marine Sciences, now under construction adjacent to the Aquarium at Coney Island, is such a place. It is the outgrowth – *"flowering"* is the better word – of the work and vision of members of the Society's staff and numerous other scientists over a span of more than half a century. In his remarks at the cornerstone-laying ceremony of June 29, Dr. Howard Rusk said, "Of all the public aquariums in the world, the New York Aquarium has made the greatest contribution to scientific knowledge. . . . This tradition goes back to the very beginnings (1902) of the institution when experimentalists like Thomas Hunt Morgan, a Nobel Laureate and the founder of modern genetics, and Jacques Loeb, the founder of the American School of Experimental Physiology, carried on research during the formative years of their great careers."

As the years passed, many others, working in collaboration with the Society's staff, have discovered, through their studies of marine organisms, new principles that have advanced scientific knowledge. Perhaps the most significant consequences of this research have been revelations of the close relationships of marine organisms with other forms of life, including human beings – expressed through physiology, neurophysiology, genetics, hereditary influences and pathology and in other ways. It is only within recent years that startling discoveries have been made that substances derived from certain marine organisms, such as sea-cucumbers, sponges and starfish contain powerful anti-bacterial and anti-viral properties. The potentialities of such substances in aiding in the resolvement of human health problems are only too obvious.

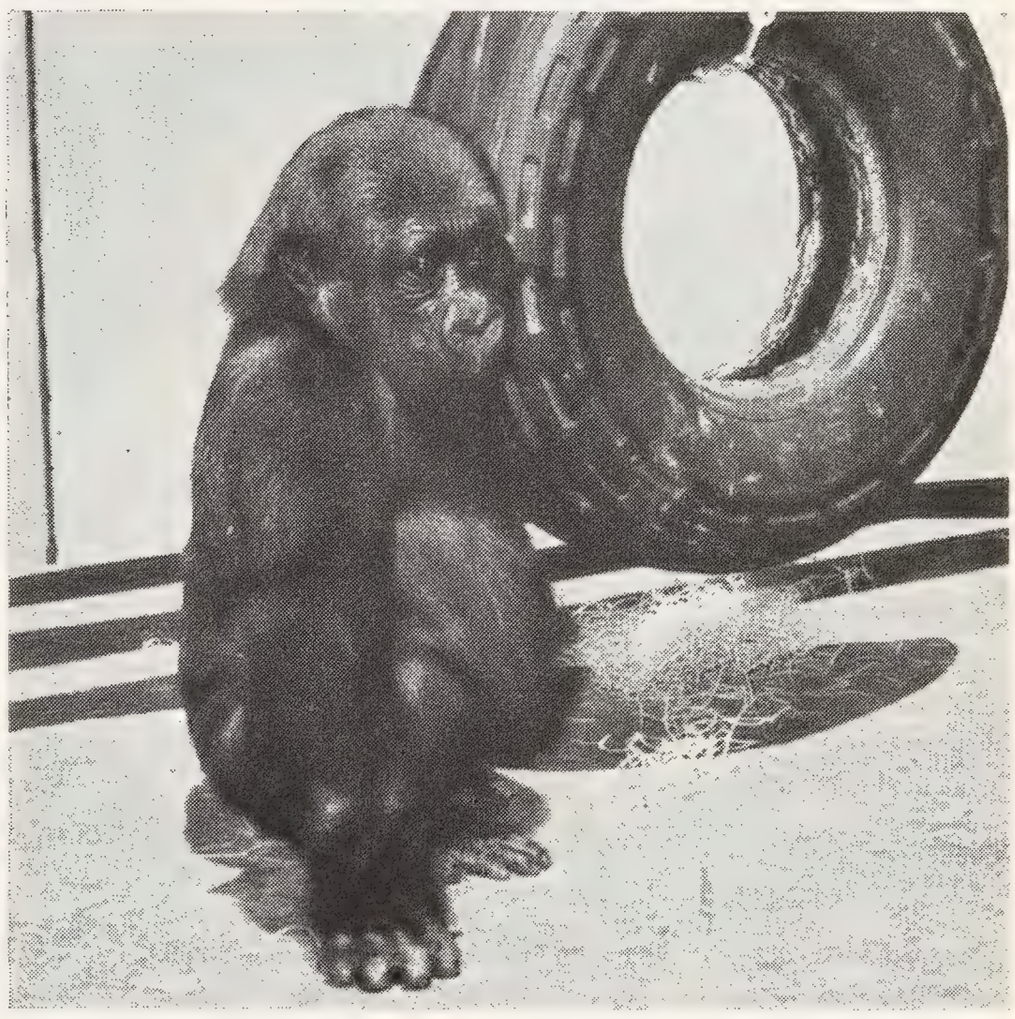
The new Marine Laboratories building is a symbol of what has been done in the past and a forerunner of even greater future accomplishments in the advancement of zoological knowledge and in contributions to human welfare.

Fairfield Osborn

FOUR BABY GORILLAS —



BENDERA: The spoiled child.



KOGA: Friendly big brother.

By CHARLES P. GANDAL
Veterinarian, New York Zoological Park

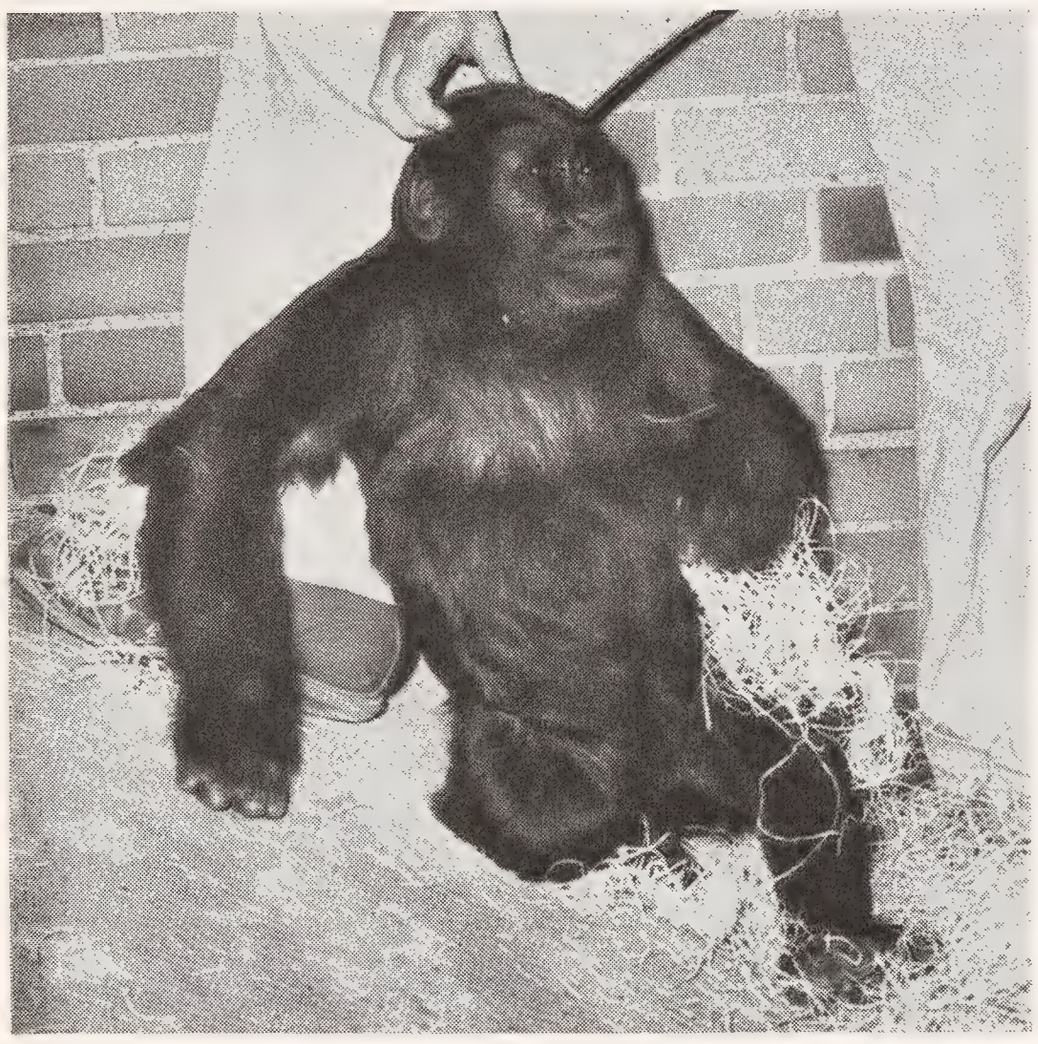
It is a reasonable prediction that in years to come our four baby Lowland Gorillas will be celebrated animals. Any record of their babyhood will then take on great interest, and so it is with an eye to the future that I set down these notes and observations made during the eight weeks that Bendera and Koga, Mwasi and Tunuka, were under my care in the Animal Hospital.

I shall not record here the detailed feeding schedules, the medication and the weekly weight record; all those statistics are on permanent file in the Animal Hospital. Rather, I want to make a record of their general care and behavior and especially to give a summary of the Hospital staff's combined impressions of their temperaments. It will be entertaining ten years from now to compare baby tendencies with mature characteristics, although we will be astute indeed if we come as close to the mark as General Curator Emeritus Crandall did with his characterizations of the Tiger cubs Rajpur, Raniganj and Dacca back in 1944. The personalities he described soon after their birth they retained to the end of their lives.

The four baby gorillas are probably about two years old — an estimate based on their appearance and weights shortly after they came to us on April 6: Bendera, a male, 24.8 pounds; Koga, a male, 24.6 pounds; Mwasi, female, 22.8 pounds; Tunuka, female, 18.9 pounds. How much contact they had had with each other, and for how long, before they came to us we do not know. In any event, they are still young enough to adjust to each other.

As Director Conway wrote recently, "The acquisition of a group of baby gorillas (and we hope to add two more before the summer is out) marks a major experiment in a new theory of captive gorilla management. Most gorillas come into captivity when they are very young. They have had little social and no breeding experience. They are kept by themselves or occasionally in pairs. They tend to become anti-social and it is

OUR PERSONALITIES



MWASI: Definitely a lady.

TUNUKA. She is the shy one.

almost impossible to keep a single female with a big male. Perhaps because of a lack of social experience and little opportunity for play and experimentation, only three pairs of gorillas have ever bred in captivity. We are attempting to establish a more natural group of animals in the hope that they will behave more normally, suffer less from the boredom of confinement and eventually breed successfully."

Warning that four young gorillas were coming and that they would be quartered in the Animal Hospital for the normal quarantine and settling-in period came weeks before the babies actually arrived, and the time was none too long. Preparations for infant care of four gorillas can be as complex, detailed and time-consuming as for the care of human quadruplets. Absolute isolation from animal or human contacts was decided upon; the only exceptions were the Hospital staff and specified curatorial and keeper personnel. Fortunately one hall of the Animal Hospital could be shut off from daily traffic by a locked door and halfway down this hall three capacious holding cages were cleaned, sterilized and set apart for the exclusive use of the gorillas. Advance preparations went so far as an order from the Printshop of a sternly-worded card forbidding entry to the hall except for personnel specified by name.

The babies arrived at Kennedy International Airport at 6:30 o'clock on the evening of April 6, the two females together in a crate measuring only 17 x 22 x 24 and the two males in a slightly larger box with a central wire screen divider. The little gorillas were obviously not frightened and so, back at the Hospital, the doors of the crates were removed and the boxes quietly set down in one of the cages. After a few minutes during which they seemed to be looking the situation over from the familiar shelter of their shipping boxes, the babies emerged and began a slow and thorough inspection of their new home.

We had built roomy sleeping boxes and installed them across the backs of two cages. The floor was deeply carpeted with straw — we later found that excelsior was preferable — and one cage had been fitted up especially for play with rubber balls, a swing and a suspended tire.

From the very beginning we left the connecting doors of the three cages open almost all of the time so that for their important first eight weeks the babies were together as a unit. When they had to be separated it was only for a few minutes to permit cleaning, medical treatment or some other such procedure.

The little gorillas seemed to approve of their housing, except for some reluctance to enter the sleeping boxes. That problem was easily solved. Hospital Keeper Gus Waltz had been assigned to the care of the gorillas for the entire period of their quarantine, and Gus has an almost uncanny "animal sense." The babies had taken to him immediately, as someone warm and friendly to cling to, and so Gus himself crawled into a sleeping box. Extending an arm or a leg, he formed a "ladder" for the babies to climb up to their bedrooms. When he offered an arm to Mwasi, she accepted it readily enough but Tunuka, the smaller of the two females (and the last of the four to make friends), clung tightly to Mwasi and slapped Gus's arm away. Since it was important for the babies to start off with an unvarying routine, and sleeping in the boxes was part of that routine, Gus merely uncurled, picked up Mwasi and Tunuka as they huddled together, and deposited both of them in the same box. After the first night or two all four gorillas learned how to get in and out of their sleeping boxes without assistance.

Diet concerned us from the beginning and we decided to get them accustomed to the "cake" that has been used with success in feeding primates in other zoological parks. Basically this is a mixture of grains and a few other ingredients, looking something like dog meal or horse feed. It contains all the essential nutrients in proper proportions, and when cooked meat and meat broth are added the mixture can be moulded into cake form. The usual practice is to feed it along with kale, oranges and, for young animals, milk and cereal, and it has the great advantage that it ensures the animals' getting a balanced diet. Previously we offered our primates large quantities of a variety of fruits and vegetables and they picked out what they wanted – a permissiveness that sometimes resulted in serious dietary problems. Contrary to popular belief, animals do not always know what is best for them.

We found that the babies were rather uninterested in kale but loved the oranges. Carrots, perhaps because of the convenient shape, they carried as they explored and played, every now and then stopping to nibble. Within a week they had settled into a good feeding routine and were well satisfied with the "cake," although they

Until they learned how to climb into their sleeping boxes, Gus Waltz climbed in with the little gorillas. They soon got the idea.

Koga took to Dr. Gandal immediately and was always wanting to show his affection. Probably he will become dominant.

preferred it in a dry and crumbly form instead of moistened and moulded.

Medically the babies required a minimum of treatment. We knew they would readily pick up human respiratory diseases, hence even the few privileged visitors were warned to stay away if they had any signs of a cough, cold, sinus or other respiratory trouble. Despite these precautions, all four developed running noses a couple of weeks after they came. Immediately we raised the cage temperature about five degrees and installed a continuously-running vaporizer — the treatment that would be suitable for a child with the same symptoms. All four remained active and their appetites held up, and on the third day three of the four were almost back to normal. Only little Bendera, the smaller male, was lackadaisical and seemed not to have improved.

A more complete examination was called for and so while Gus Waltz held him tight against his own body, I checked temperature, pulse and respiration. A mild elevation of temperature (just over 101) and some lung congestion indicated a course of antibiotics. We used a flavored broad-spectrum antibiotic that is commonly prescribed for children. Gus saw to it that Bendera took his medicine every day, usually in a specially sweetened cup of milk. By the second day he showed great improvement and by the third he was pretty much back to normal.

Tuberculin testing was routine, as with all new primates. All clear. Routine, too, was checking for internal parasites; the babies were carrying two types of roundworms which were not heavily concentrated and readily yielded to medication.

* * *

For the whole of their stay in the Animal Hospital, Gus Waltz was their closest companion and friend. Most of his working day was spent feeding, cleaning, playing and napping with the babies. As their personalities became clear, revealing traits were noted by Gus in our Gorilla Diary and any variation in the daily routine was recorded. This intimate knowledge of their personalities and habits kept us one step ahead of them and enabled us to spot trouble long before it would have been apparent to anyone less familiar with them.

For example, shortly before the opening of the Children's Zoo two orphaned lambs were temporarily housed in the Animal Hospital. The only cage available was the out-of-doors half of a compartment in the same hall as the little Gorillas and we bedded them down there without the slightest thought that they might disturb the gorillas. The lambs did "talk" occasionally — *baa, baa, baa* — at night, and even during the daytime when they were hungry, but the sound was not particularly loud or frightening. To us, that is.

I find in Gus's Gorilla Diary a note two days after the lambs arrived:

"Gorillas irritable and looking for more attention during the day. Seem discontented and are apparently upset by lambs crying. Whenever the lambs baa, all four gorillas cling together and they have not taken their afternoon nap since the lambs are in the Hospital."

That one observation was enough. The lambs had to go. Early the next morning we moved them to the Children's Zoo, whether it was ready to receive them or not, and that afternoon Gus noted:

"The gorillas are taking their afternoon nap

lying on the bottom of the cage all in one bunch." The next day he wrote: "All gorillas seem back to normal habits and are not as irritable nor as demanding of attention as they were before."

To relieve Gus on two days a week, a single relief keeper was assigned to the babies. Fred Sterling, one of the capable young keepers in the Mammal Department, was selected and performed an admirable job, making several good suggestions regarding their care and recording interesting observations in the Gorilla Diary.

It was planned that the public "unveiling" of the gorillas would be on June 10, on the occasion of the Garden Party for Members of the Zoological Society. Their new home would be in the Great Apes House, displacing a family of gibbons which would be moved to the Monkey House. The gibbon compartment was modified slightly and sterilized inside and out with live steam. When all was in readiness, the question of the actual moving arose. Should Gus and Fred simply pick up the babies and carry them the few hundred yards in their arms, early in the morning before the Park was active? I put the problem up to Gus and was happy when he voted to crate them and transport them in the Animal Ambulance.

In a very few minutes they were induced to enter a clean, well-padded, light crate, and they sat quietly and contentedly, not in the least disturbed by the ride and the jostling as the crate was carried into the Great Apes House. Gus's familiar voice and his presence beside them undoubtedly were reassuring.

Gus worked with the babies for three days in the Great Apes House to instruct their new keeper and to effect a smooth transition to their new home. Then came their first public appearance at 3:45 o'clock on the afternoon of June 10 when Gus sat quietly on the mound outside the door of their compartment . . . the door opened . . . four black and shining little faces peered out and a moment later the babies emerged, shyly and with deliberation, and began to climb into their friend's arms. I think all of us on the Hospital staff, watching the babies become the climax of the Garden Party, knew how parents must feel when their children perform brilliantly in graduation exercises.

* * *

At the beginning I promised to record our collective impressions of the personalities of our gorilla "children." Here is how we assessed them.

Bendera is the spoiled child. Gus often noted that if he did not have his way, he would become angry and stalk around the cage with his lower lip curled down in a definite pout. He might stay out of humor for five or ten minutes until Gus gave him extra attention or a special treat, and then all was forgiven and he became his old playful self.

Koga is the friendly big brother type. He gets along well with everyone and will probably be the dominant male. Easy-going, good natured,

The babies had so greatly enjoyed romping in a pile of excelsior in the Hospital compartment that mounds of it were provided at the Great Apes House. Their friend Gus played too.

Above — Keeper Fred Sterling pretends he is a gorilla, too, and rushes little Bendera. Below — All the babies like to be swung. This is Mwasi swinging, while Koga awaits his turn.

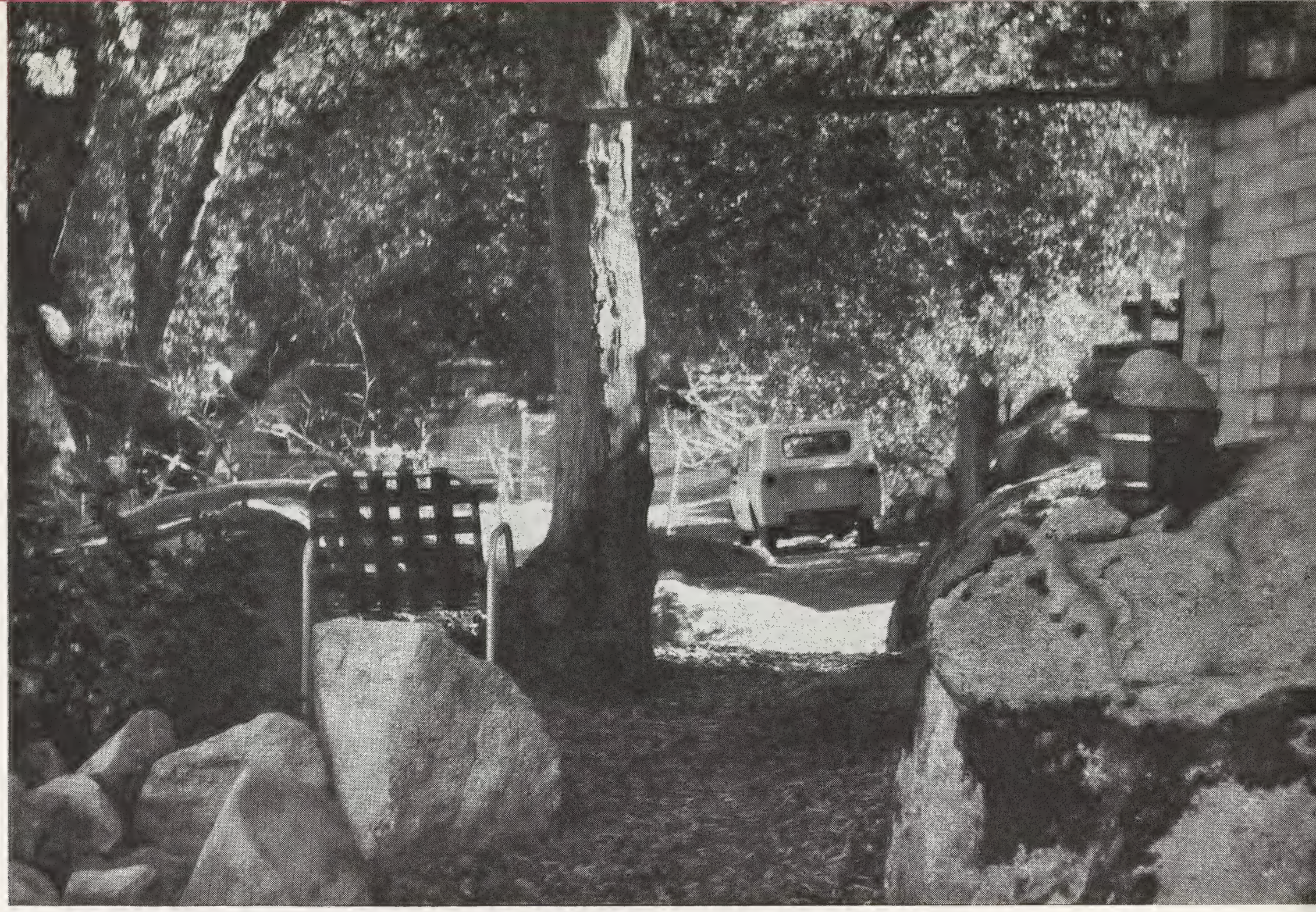
Both photos by Emmy Haas

he loved to have Gus play with him, and they developed a little game. Gus would hold him tight despite his struggles, and then suddenly release him. Koga would quickly run into the next cage as though he were angry, and then just as quickly run back to Gus, climb into his arms and hold tight.

Mwasi, the larger of the two females, is definitely a lady. She seems to have had more attention from human beings prior to her arrival with us, and Gus noticed quite early that she required extra gentle handling but repaid it with displays of affection. Her special game was to play pattycake with Gus.

Tunuka is the shy one. Smallest of the group, she desired affection but the conditions had to be just right; she was always reluctant to make advances, to "give out," and most often she compromised by clinging to Mwasi, who filled the role of big sister.

So that is the way they seem to us now. Ten years hence . . . well, we'll see.



Spotted Skunks Make Interesting Neighbors

By FRANK F. GANDER

Lakeside, California

ONE SPRING when I was living on a rocky slope of El Cajon Mountain in San Diego County, California, I often sat outdoors in the evening to study two Ringtails (*Bassariscus*) that I had attracted by putting out food for them. Before long, two Spotted Skunks (*Spilogale putorius*) began to compete with the Ringtails for the food, and their interaction considerably heightened the interest of my observations. These small skunks, often mis-called "civet cats," are found throughout most of the United States except along the Atlantic Coast and the northern tier of states from Maine to Montana. They also range south through Mexico and Central America.

My skunk visitors were a male and a female and as they differed markedly in their pattern of white spots and stripes, I soon learned to recognize them. For identification in my notes I named the male "Gordo" and the female "Señora Zee" (*zorilla* is the Mexican name for this animal). They tamed readily, and by early summer were climbing into my lap to take food from my hand. In July, Señora Zee brought three young ones to my woodpile.

Her babies were large enough to run around, but she left them in the woodpile while she foraged and brought food to them. She quickly learned to come to me for bits of dog biscuit or raisins which she carried to the young. As she left my lap, she would start grunting, and the young would come to meet her. One of these disappeared, but the other two, a male and a female that I named "Don Juan" and "Topsy," were in the neighborhood until they were well grown. By early August they were visiting my

low kitchen-window feeding shelf (about six feet from the woodpile) and getting some food for themselves, but they were still largely dependent on their mother.

Apparently the mother was no longer able to nurse the young, for after feeding them several of the dry dog biscuit pieces I gave her, she would go foraging for something with a higher water content. Sometimes she would return with a mouse and sometimes with a mouthful of mulberries. Once when she had been gone only a minute or so, she returned soaking wet. She went into the woodpile grunting for the young.

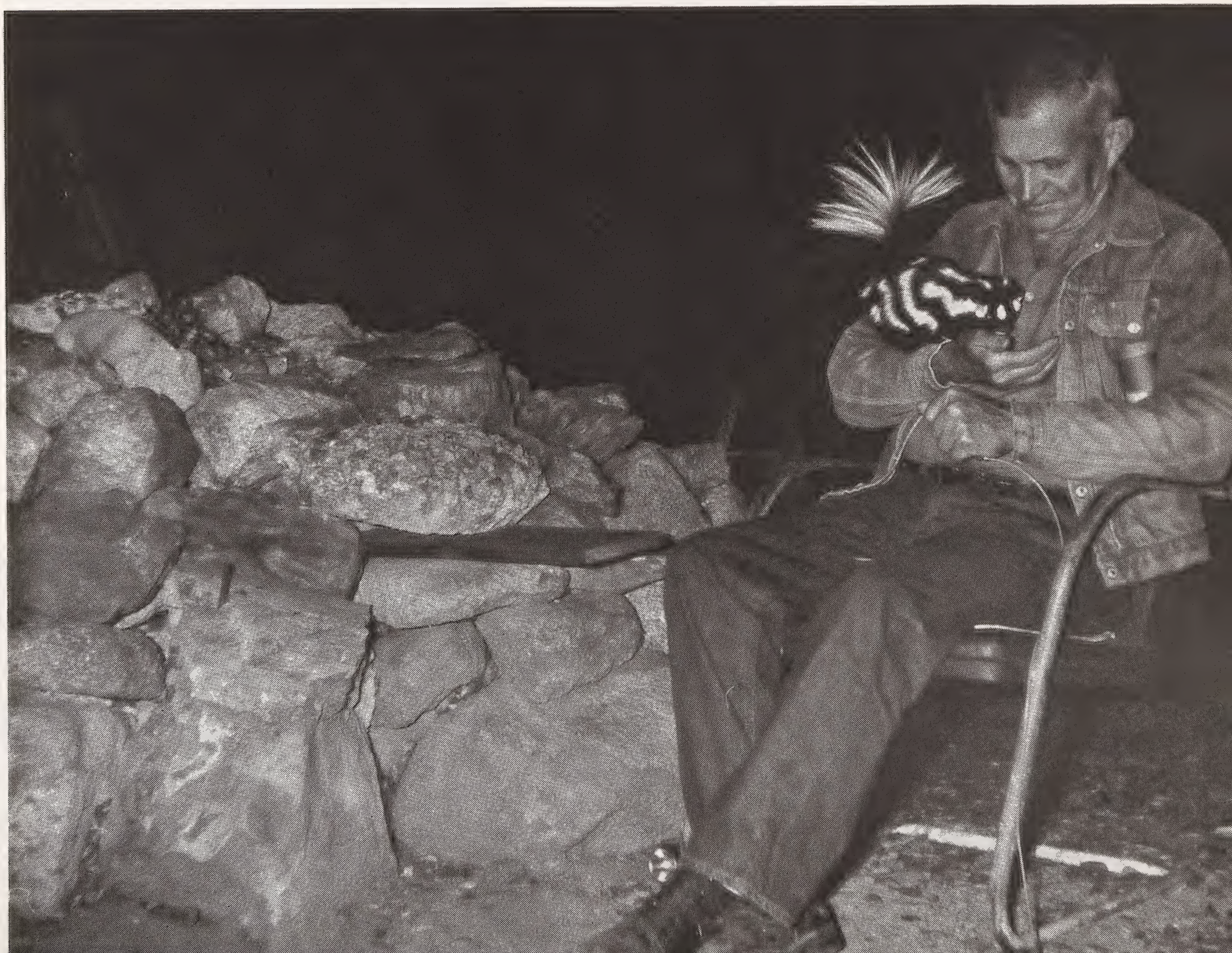
The only open water nearby was in a bird-waterer on the opposite side of the house, so I went to look at it. It had been made by standing on end a piece of cement pipe eighteen inches in diameter and two feet tall. A false bottom had been cemented into the upper end of the pipe, about three inches below the rim, and a float valve kept two inches of water in the basin at all times.

A wet smear on the concrete showed where the skunk had come down the side of the pipe. This whole episode puzzled me greatly. Why had she climbed up to this water when, only a hundred feet away, water was easily available in a low bee-waterer? How did she get so thoroughly soaked in two inches of water? Why did she not shake herself when she got out? The only explanation I could think of was that she had gone to this water source because it was close to her young, and deliberately soaked herself in the water and returned to her young without shaking herself so that by licking her wet fur they could get the water they needed.

The young skunks soon quit staying in the woodpile and gradually became more and more independent. One night the young male, Don Juan, came in with a beautifully marked little female that I had not seen before, and I named her "Chiquita." The mother and daughter were already present, and the arrival of this newcomer caused much excitement. All began running

eft — Gray foxes came for food placed on the slop-ng rock to the left of the chair and Ringtails and potted Skunks visited the feeding shelf high on the ght. Below—The author with a wild Spotted Skunk.

All photographs by the author.



around erratically, Topsy as fast as the others, but she was running on her front feet only with her body and tail held vertically.

Sumner & Dixon[1] state that this is the way the Spotted Skunk aims its scent "gun," but I find that this is more of a bluff. Many times I have seen Spotted Skunks assume this stance, and never has it been followed by discharge of the musk. If a skunk catches the scent of Gray Fox or Raccoon but cannot locate the animal, it may walk on its front feet as it comes toward the feeding shelf. It can walk down a smooth, steeply sloping rock face in this position without difficulty. At times, a Spotted Skunk will get up on its front feet to run at a Gray Fox and chase it away from the bait.

Three times I have watched at close range as a Spotted Skunk discharged its musk, and none of these discharges was preceded by the hand stand. Once a young male Spotted Skunk and a Ringtail were shoving each other around on the window feeding shelf. The two animals were standing head to tail, and the Ringtail carelessly let its long tail settle down across the face of the skunk. The skunk resented this and gave the Ringtail a push with its rump. The Ringtail nipped the skunk on the thigh, and the skunk sprayed its retaliation. That was the end of the episode; the Ringtail jumped wildly from the shelf and vanished into the night.

Another time two skunks, a male and a female, were feeding at either end of my window feeding shelf, which is four feet long. I was watching from just inside the glass and noticed that they became alarmed. I could hear some animal walking below the window, and as the sound came opposite the center of the window the two skunks jumped away, spraying as they went. In complete disregard of the strong skunk odor, a Raccoon then came up on the shelf and started eating. Always these Spotted Skunks are afraid of the Raccoons and never try to bully them as they do Gray Foxes and Ringtails.

The skunk odor was unpleasantly strong inside the house, as well as out, but I did not find it at all difficult to bear. Later, when a skunk, by using its spray, drove a Ringtail away from a dead ground squirrel I had given it, I went directly to the spot and stooped down over the skunk to test the effect of the odor at its strongest. It was disagreeable because it was so strong, but it caused me no discomfort whatever. Certainly it was no more offensive than strong tobacco smoke, heavy automobile exhaust or chemical vapors. From this experience, I began to wonder whether the violent response most people make to even a faint whiff of skunk odor is not almost entirely the result of social custom rather than from any discomfort caused by the odor.

Spotted Skunks often give off a small amount of scent without actually spraying their musk. When arguing with another Spotted Skunk, a Gray Fox or a Ringtail, my skunks regularly everted the rim of the rectum so that the nipples of the scent glands were exposed. They may, then, give off a small amount of scent. When Gordo and Señora Zee first started taking food from my hand, they sometimes scented slightly as they ran away after taking the food.

In the fall, Gordo was away for about two months, and when he returned part of his right foot was missing. All of the toes except the inside one, and part of the outside of the foot, had been cut off, probably by a steel trap. His injured foot was very tender when he first returned, but it toughened rapidly and soon was very little handicap to him.

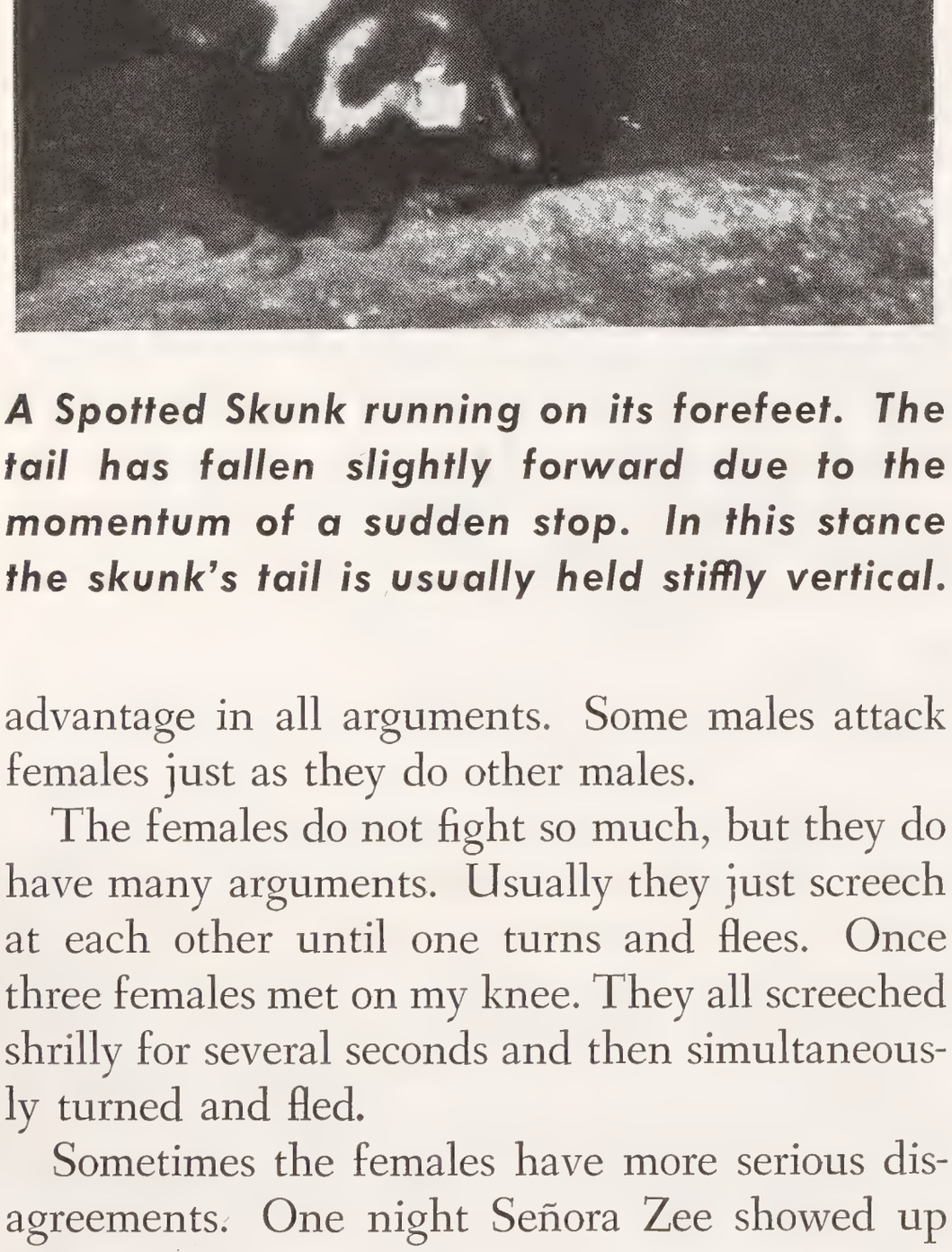
One other male Spotted Skunk that comes to my window, designated "Stumpy," has his right hind foot cut off at the ankle. This handicaps him some in climbing over rocks, but both he and Gordo go everywhere on the run just like the rest of the Spotted Skunks. They do show more of the rockinghorse motion that is characteristic of these skunks.

Gordo is just as pugnacious as he was before he received his injury. He holds top dominance in this colony of skunks, which increases greatly

A young male Spotted Skunk prepares to drive a Ringtail away from the food on one of the feeding platforms by turning around and offering the intruder a formidable rear tail view.

in numbers during the late summer and fall, and he is always quick to assert it. He chases any other male that comes near and attacks any he can catch. I once saw him slip up behind another male and jump on him. The two tumbled about wildly for a few seconds, the other male squealing shrilly all the time. Finally it broke free and ran with Gordo in close pursuit.

Gordo is not so fierce with females, but he does not hesitate to push them away from food and take it for himself. He twists his rump against the female and then uses his greater weight to push her around. The males are all larger than the females (Van Gelder[2] says 8% to 10%), and they use this greater weight to their advantage in all arguments. Some males attack females just as they do other males.



A Spotted Skunk running on its forefeet. The tail has fallen slightly forward due to the momentum of a sudden stop. In this stance the skunk's tail is usually held stiffly vertical.

The females do not fight so much, but they do have many arguments. Usually they just screech at each other until one turns and flees. Once three females met on my knee. They all screeched shrilly for several seconds and then simultaneously turned and fled.

Sometimes the females have more serious disagreements. One night Señora Zee showed up

A live oak tree served as a main highway to and from the high window feeding station for the Spotted Skunks and Ringtails. This skunk is heading for the ground after a night meal.

with all the hair pulled from the top of her head, with the exposed skin scarred and with a small piece of her left ear torn away. A little later another female came in with all the hair pulled from the top of her head. Possibly these two had met in some narrow crevice in the rocks where each could only reach the other's head. The fight must have been a draw, for afterward, whenever they met at the feeding shelf, both backed away warily.

These skunks vocalize at almost every meeting. If a male comes toward a female, she may start to chatter shrilly; then if he attacks her or pushes her, she screeches in protest. The harsh screeching is usually in protest or defiance. It changes to a shriller squealing when an animal is hurt or defeated.

Once I watched as two young males met, possibly for the first time as neither ran from the other. They walked along side by side, stiff-legged and alternately grunting and growling. They went into a hollow place in a woodpile and there started to fight. They tumbled over and over, and both screeched loudly. One began to squeal, and then it jumped out of the woodpile and dashed away into the darkness with its adversary after it.

One other time I heard a Spotted Skunk grunting and growling alternately. It was arguing with a Ringtail in a narrow passageway down in a pile of rocks. These grunts sounded to me much like the ones used by Señora Zee in calling her young, but to skunk ears they may have been distinctly different.

Spotted Skunks have a very keen sense of hearing and also a keen sense of smell. They are always foiling me when I try to leave food for the Ringtails, even when the skunks have to climb rock walls or trees to reach the bait. Sometimes they find such places by trailing the Ringtails to them but at other times they find the food before the Ringtails do.

A new feeding shelf about 12 by 18 inches which I put up at the base of a large window on the downhill side of a house was over six feet from the ground. To reach it, the animals (I thought) would have to climb up a liveoak and then cross to the shelf by walking about seven feet on a 2x2-in. stake which I nailed from the tree to the shelf. Several skunks found the shelf before the Ringtails did. A male skunk, "Chester," went up the tree and across the stake as I had planned, but several little females climbed up the corner of the house, which was built of cement blocks and bricks. These skunks usually went back down at the corner they used going up, and they always went down head first.

On one occasion a skunk came across the stake, and as it approached the shelf where a Ringtail was feeding it started to twist its body around to direct its scent glands toward the Ringtail. It twisted itself right off the stake. The six-foot drop did not hurt it and in just two or three seconds it had climbed up the corner of the house to the shelf.

When the skunks fell from the high feeding shelf I was reminded that they sometimes back off of my lap and fall to the ground. I think this is because they depend very little on their sense of sight. This was especially evident at the lower window feeding shelf. When the outdoors was lighted and the inside of the house dark, any skunk coming on the shelf would see its own reflection in the glass. A newcomer might be startled into backing off the shelf. It would quickly return, sniff at the reflection, and then completely ignore all movement it saw inside the glass.

If I turned on the inside light and stood close by the window, the skunk would ignore me, just as it had its own reflection. It seemed to feel that if it could not smell me, I was not really there even if it did see me. However, if I scraped or knocked on the under side of the shelf, which is the top of my woodbox, the skunk would jump down and run to the woodpile to hide well back among the sticks.

In bright moonlight or in lighted areas these Spotted Skunks try to avoid open spaces. They will usually circle around the edges of such spaces instead of crossing them. When running about, they carry their tails over their backs with the hair spread out. They may keep their tails in this position when they stop to eat, or they may lower that appendage and swish it back and forth. In either position, it probably serves as a decoy target for any attacker. A Horned Owl or Bobcat or other predator would probably concentrate its attack on the conspicuous white plume of the tail.

Children's stories and other literature have presented the skunk as an independent, slow-moving creature that has no fear of other animals. This may be partially true of the Striped Skunk, but it is not true of these smaller Spotted Skunks. They are apprehensive and always alert for danger. Even the sudden arrival of a Ringtail will cause a Spotted Skunk to duck into hiding, although it will probably return quickly and drive the Ringtail away. Often one will hide as a Gray Fox comes near the feeding area, only to return and drive the fox away from the food.

I have found skunk hair in fox scat, but this may have been from carrion or from young skunks. Crabb[3] reports that Spotted Skunks he was studying did not use their musk until they were 46 days old. A neighbor of mine who has trapped many of these skunks tells me that very young ones cannot use their defensive spray. Perhaps habits of caution developed during these early vulnerable days may carry over into the lives of the adults.

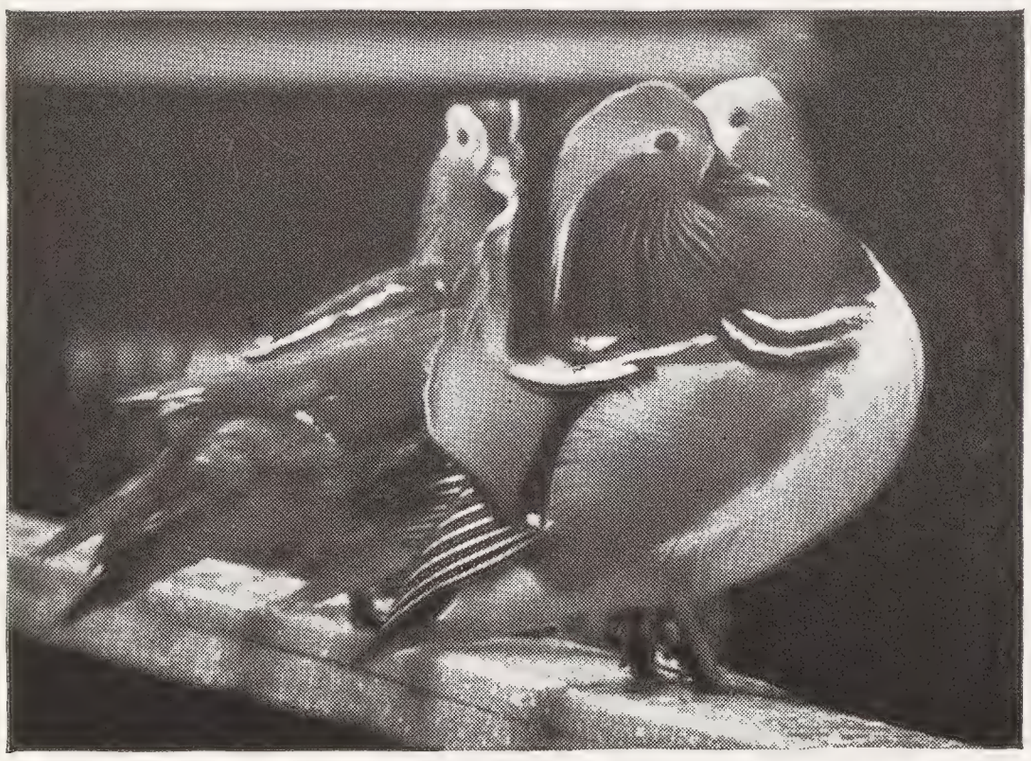
Many of "my" skunks have ceased to be apprehensive about me and have learned to trust me. Twelve or more individuals will come into my lap for food. I give them only enough to bring them near so I can study them, not enough to make them dependent on me. Most of each night they live their normal wild lives – only a little while each evening do I enjoy their friendly visits.

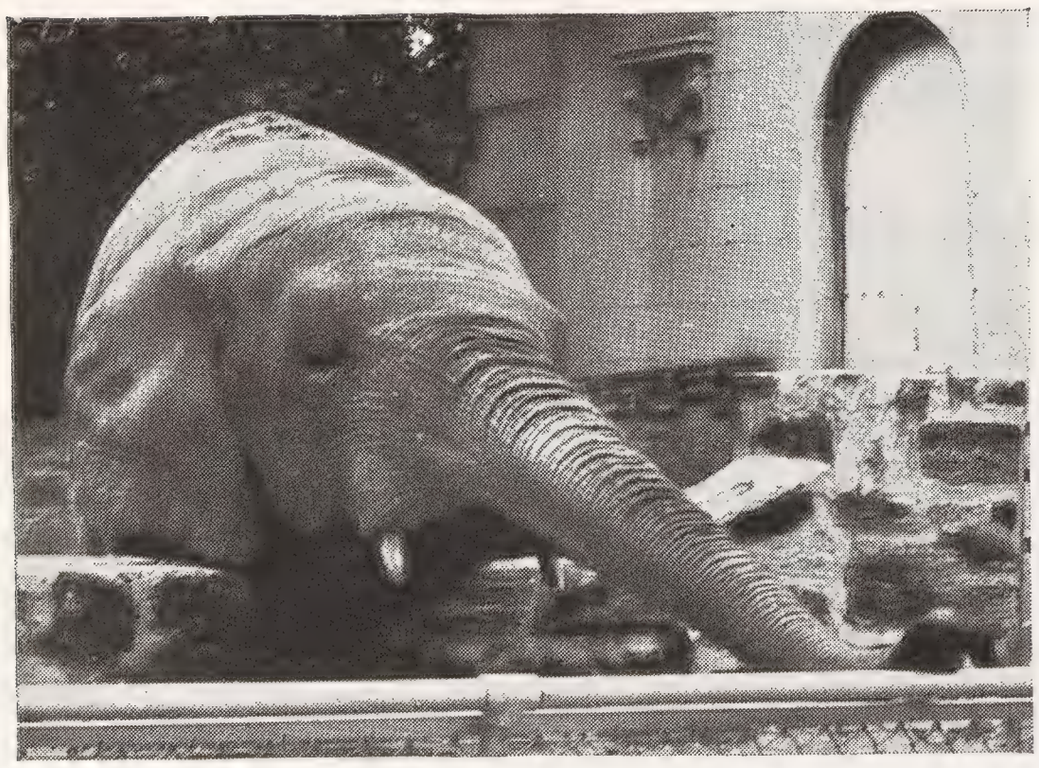
1 Sumner, Lowell, & Dixon, Joseph S. "Birds and Mammals of the Sierra Nevada," p. 335, 1953.

2 Van Gelder, Richard G. *Bulletin of American Museum of Natural History,* Vol. 117, Art. 5, 1959.

3 Crabb, Wilfred D. "Growth, Development and Seasonal Weights of Spotted Skunks." *Journal of Mammalogy,* Vol. 25, pp. 213-221, 1944.

IT'S EASY TO TAKE GOOD PHOTOS OF ANIMALS IN THE ZOO!





BY SYLVIA C. BERGEL

Photography Instructor, School of General Studies, Queens College

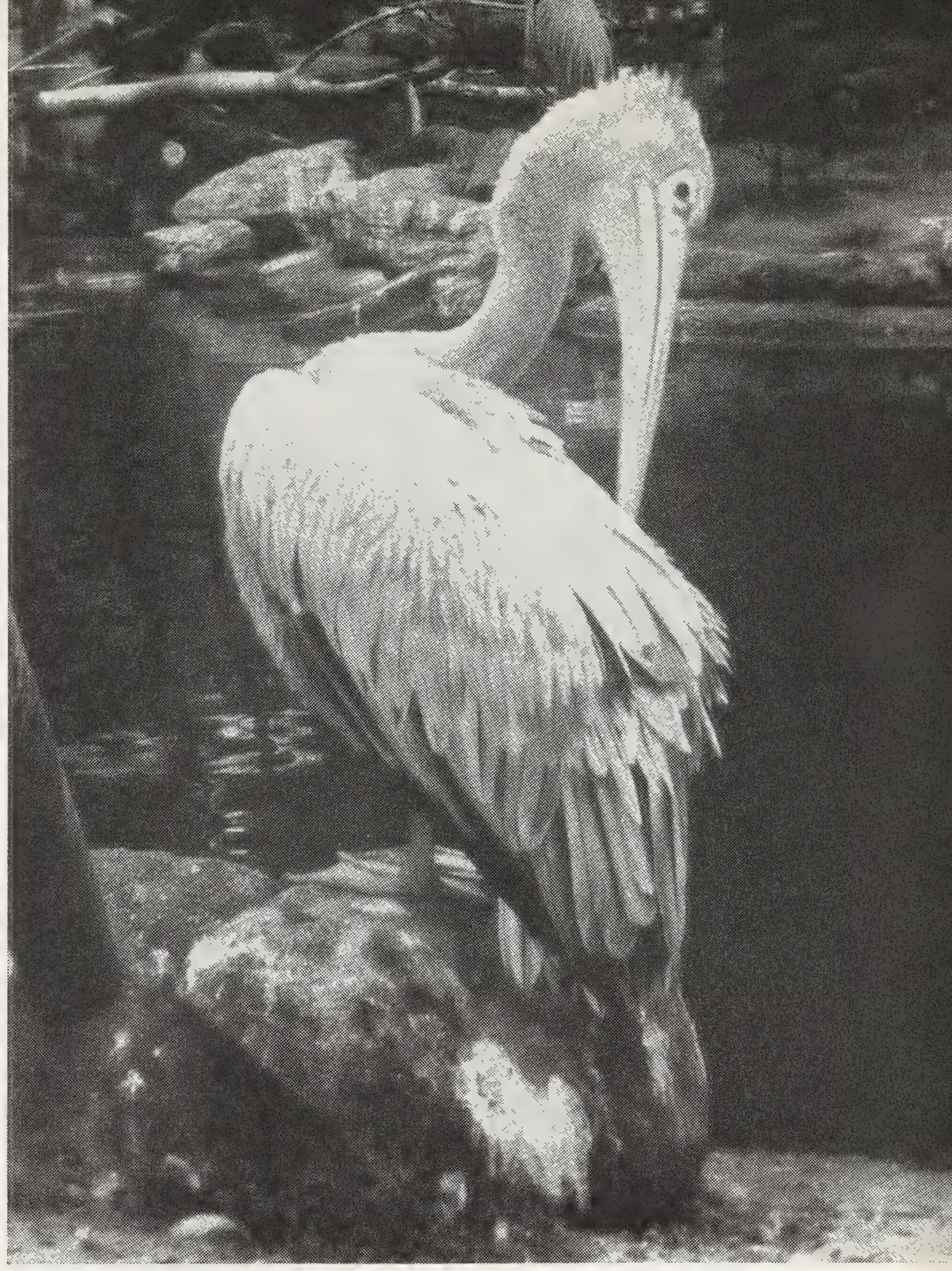
On one of the rare rainy Saturdays this Spring Mrs. Sylvia C. Bergel brought a group of Queens College students to the Zoological Park on a photographic tour. They asked for no special privileges – they simply walked around the Zoo and photographed what interested them, as any visitors might do. Nevertheless the photographs that resulted were so interesting that Queens College plans to make an exhibition of the student work next fall. To stimulate good Zoo photography we asked Mrs. Bergel to comment on the opportunities and equipment of the amateur photographer. – Ed.

LOOK AT THE PICTURES accompanying this article, without reading the captions. Can you tell which were taken with a two-dollar box camera, which with a hundred-and-fifty-dollar Rolleiflex, which with a three-hundred-dollar Canonflex, and which with a subminiature camera that is about the size of your forefinger? If you find it hard to match the pictures to the cameras I have listed, it is not because all the cameras could have taken all the pictures, but because at the Bronx Zoo there is ample subject matter for every type of equipment. These shots were taken by a visitor who had no special facilities, and used neither flash nor a tripod. Only one kind of film was used for all of them, Kodak Tri-X (ASA 400), and, except for the Minox (for which I used Microdol-X), all were developed in that reliable old standby, D-76.

In order to succeed with animal pictures, the photographer must have first of all a sympathetic understanding of animals, which enables him to recognize characteristic and interesting poses. Second, he must have patience to wait for the favorable moment for shooting, and also patience to endure his often large number of unsuccessful negatives for the sake of the occasional really fine ones interspersed among them. Third, he must have learned through practice quickly to judge lighting and background, and thus to avoid the confusing jumble that spoils many Zoo pictures. Finally, he must be aware of the limitations of his equipment and work within them.

Although the illustrations were selected to represent a wide range of cameras and picture problems, they have some characteristics in common: they all show one or two animals filling a large part of the picture area; an effort has been made to avoid backgrounds that have the same tone and texture as the animal (not always an easy task, because of the animals' protective coloring); attention has been given to light and the problem of confusing shadows; and no bars or fences show between the subject and the camera.

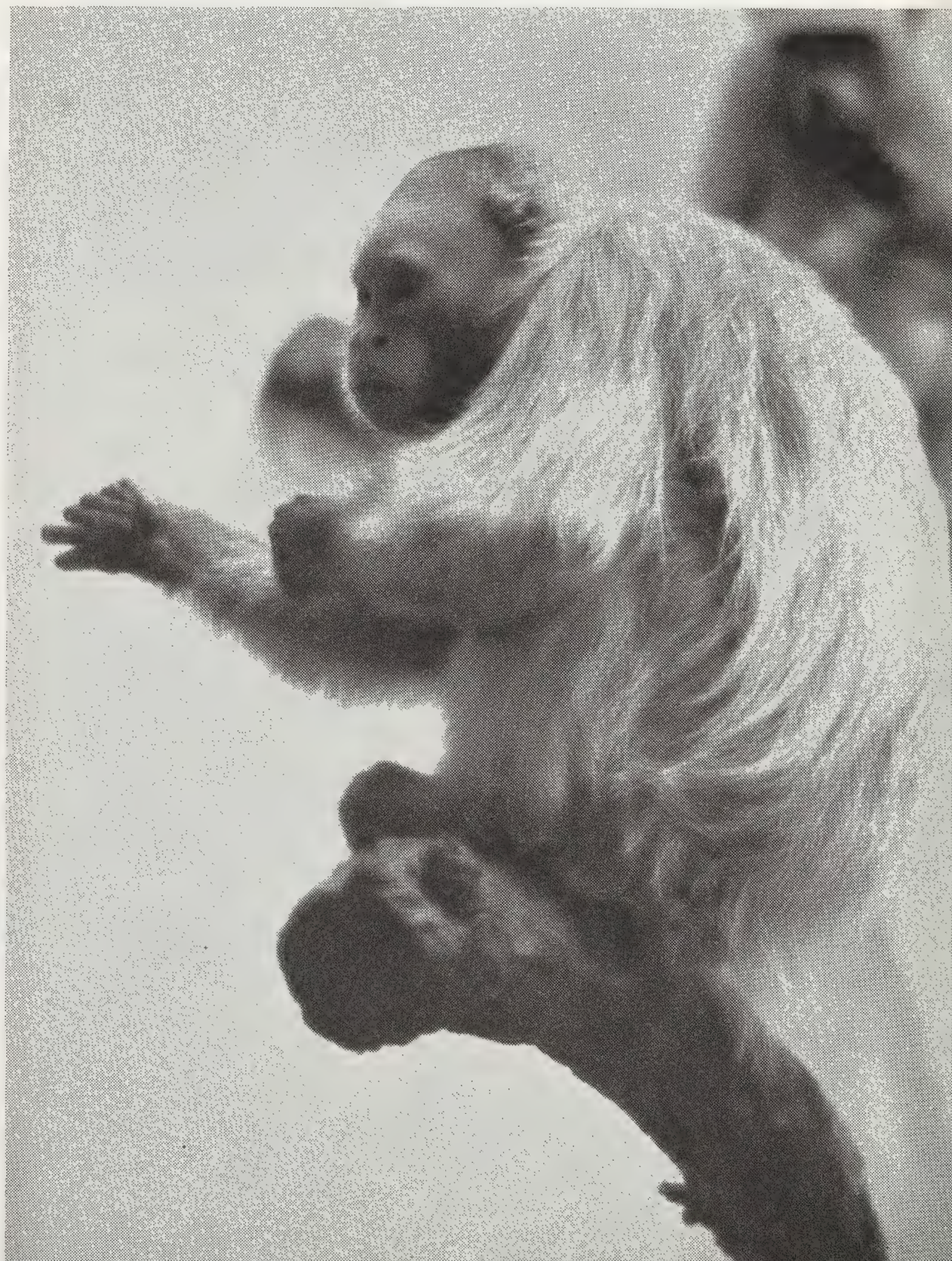
To explain the technique of getting the most out of each of this variety of cameras, I am going to take the practical course of using the illustrations as guideposts, starting with the picture of the pelican. Surely nobody visiting the Bronx Zoo will bring a camera simpler than the fifty-year-old No. 0 Box Brownie that produced it! Everything about this camera is "fixed": fixed focus, fixed lens opening and fixed shutter speed. A small element of choice was obtained by loading the camera with Tri-X film (size 127). The high speed of this film made overexposures inevitable outdoors, unless something were done to cut down the light; this I easily accomplished by taping an orange filter over the lens. Now I was set for picture taking outdoors; to shoot well-lit indoors subjects I simply took off the filter. The pelican was photographed through a space in the mesh of the flying cage, and offered an ideal subject: he was nearby and contrasted well with his surroundings. I then took the box camera into the Aquatic Birds building, where, by removing the filter, I was able to take advantage of the high speed of Tri-X film to obtain excellent negatives of the best-lighted exhibits.



***RED-BACKED PELICAN.** No. 0 Box Brownie with orange filter. Negative size 1 5/8 x 2 1/2 in.*

***VIOLET-NECKED CASSOWARY.** Rolleiflex, 1/50 second at f/11. Subject in heavy shade.*

***BALD UAKARI.** Canonflex, 50 mm. lens, 1/30 second at f/1.8. Indoor exhibit, through glass.*



SUN BITTERN. Canonflex, zoom lens at 150 mm., 1/30 second at f/4.8. Cloudy weather. Indoor exhibit, but with an open front.

NYALA AND ABYSSINIAN BLUE-WINGED GOOSE. Canonflex, zoom lens at 210 mm., 1/125 second at f/16. Cloudy weather.

SPARRING RHINOCEROSES. Canonflex, zoom lens at 210 mm., 1/125 second at f/16.

LION. Canonflex, zoom lens at 210 mm., 1/25 second at f/16. Very cloudy weather.

A camera with a medium-speed lens, a fairly fast shutter, and focusing, increases photographic possibilities, and is the type carried by most Zoo visitors, usually in 35 mm. or in 120 size. I selected the Rolleiflex. Now I was able to get closer to the subject (within two-and-a-half feet, while the box camera must be no closer than six); I did not need the filter because I could speed up the shutter to cut down the light; and I could increase the lens opening to cope with dim light. More subject matter became available to me: animals in shade, closeups of animals' heads, and indoor exhibits with moderate illumination. The picture of the cassowary's head was taken outdoors in heavy shadow. A camera of this class produces negatives with definition so sharp that small areas can be selected and enlarged; this feature compensates to some extent for the lack of interchangeable lenses.

Although there is endless material at the Zoo for this last-mentioned kind of camera, anyone who wishes to take full advantage of what is offered, and also to do nature photography outside the Zoo, would do well to equip himself with a more versatile camera. The first consideration should be size and weight: no matter how fine and capable the equipment is, if it is so heavy and cumbersome that the photographer is reluctant to carry it, it is practically worthless. With the recent improvements in films, the 35 mm. camera is an excellent tool for the nature photographer. It is relatively small and light, extra lenses are not extravagantly expensive and heavy, and film is cheap and easily available. Most of the pictures illustrating this article were taken with a Canonflex, a 35 mm. single-lens reflex camera with a pentaprism for eyelevel viewing and focusing. The normal lens for cameras of this class is a fast anastigmat of 50 mm. focal length, which does well with nearby subjects

ELEPHANT'S MOUTH. Canonflex, zoom lens at 210 mm., 1/125 second at f/11. Light rain.

INDIAN GRAY HERON. Minox, 1/100 second at f/3.5. Indoor exhibit, through glass. Sun.

even in poor light. A telephoto lens in addition is needed, and I think that one whose focal length is about 200 mm. is the most practical. It quadruples the image size (so that if a lion is a quarter-of-an-inch high on a negative made with a 50 mm. lens, it is one-inch high on one made with a 200 mm. lens, from the same distance). A shorter focal length does not give sufficient magnification, while a longer one is hard to hold steady without a tripod, and increases other problems. I have a Sun Zoom lens, whose focal length can be varied from 85 mm. to 210 mm. Despite its moderate speed (the largest opening is f/4.8), I have found it ideal for Zoo photography because it is small and light, and the image size can be varied by a twist of the wrist. Of the Canonflex pictures shown here, all but one were taken with this lens.

The monkey on the branch was photographed indoors through the glass front of the exhibit, and the weakness of the light made the f/1.8 50 mm. lens the only possible choice. Of course, this short focal length led to the inclusion of a lot of unwanted material, which I cropped out in printing. When conditions are as unfavorable as this, with poor light and rapidly moving subjects, it is wise to make a number of exposures and gamble on getting one or two good negatives.

One of the most rewarding exhibits at the Bronx Zoo is offered by the new Aquatic Birds building. The birds are presented in carefully tended natural surroundings, where they can be photographed to such advantage that good pictures are almost automatic; indeed, much credit for their beauty should go not to the photographer, but to the people who designed and maintain the exhibits. A telephoto is not needed here, nor is an ultra-fast lens required for most of the displays, but the former can be used to good advantage for closeups. Beautiful as the simulated habitats are, not all lend themselves to photography; for example, the water splashes on the glass of the cliff-and-rock pool are a handicap, and the Indian fishing owls need such a long exposure that a tripod is required. For this article I have selected a shot of the Sun Bittern on her nest, exposed at f/4.8, with the zoom lens at 150 mm. The background, which could easily have merged with the bird and caused hopeless confusion, was controlled by the large lens opening, which kept it out of focus. Selective focusing is a valuable method for avoiding mergers and subduing troublesome backgrounds.

When two or more animals are included in a picture, it is important to have them close together and related in their pose, as in the African Plains shot of the female Nyala and the Abyssinian Blue-winged Goose, and the picture of the White Rhinoceroses sparring.

The Lions are another delight of the African Plains, and can be photographed with all cameras. Those without interchangeable lenses will produce scenes with the Lions as center of interest, while the cameras with telephoto lenses can pick out individual animals, or even just heads. The Lion portrait I have included was photographed with the zoom lens set at 210 mm. and the negative was cropped in enlarging. Of course, another advantage of the telephoto lens is its ability to give a large image and suggestion of closeness, even when the photographer is forced to the back of a crowd, as I was when I took the picture of the elephant's mouth.

And now, what about those increasing numbers of Zoo visitors who bring tiny subminiature cameras? They can photograph anything that the owner of a good camera with non-interchangeable lens can shoot, and in addition they can operate at extremely close range. For the sake of uniformity I used Tri-X also in my Minox when I took the picture of the herons in the Aquatic Birds exhibit, but slower films work well here and do not give such coarse grain. The actual taking of pictures with subminiature cameras is not hard, but the ease of portability and handling must to some extent be paid for by meticulous processing.

Some of the most frequent sources of disappointment in Zoo, as well as other forms of photography are, first, failure to hold the camera steady; second, inclusion of confusing backgrounds; and third, getting too much in the picture, with the real subject small and insignificant. Learning to avoid these faults comes with practice and experience; money invested in film is better spent than the same amount spent for gadgets. If you take lots of pictures and analyze your successes and failures, you will have an ever-increasing percentage of good shots that you will enjoy yourself and display with pride.

The Penguin Metropolis of Punta Tombo

By WILLIAM G. CONWAY
Director, Zoological Park

NO MATTER HOW EXCITING the identification of a single rare bird in the forest, it lacks one quality inherent in a first view of a large colony of nesting seabirds — sheer awesomeness. My first view of the bird colonies of Punta Tombo was doubly rewarding, for not only were they awesomely huge, but the biggest colony consisted of penguins, and penguins have a special fascination for me.

It was December 5 of last year and we were approaching the last camp of our Argentine Wildlife Expedition (see *Animal Kingdom,* Jan.-Feb., 1965). Dr. William H. Drury was needed back in Massachusetts and Zoological Society Trustee Robert G. Goelet and I had to get back to New York. Penguins were our last photographic goal and we were concerned that the birds might not be breeding. When Bob maneuvered our station wagon through the last treacherous Patagonian gully and to the top of the final scrub-covered hill overlooking the restless Atlantic, we scanned the slender rock and clay finger called Punta Tombo anxiously. But it was all right; the birds were there; not less than 150,000 and perhaps as many as 300,000, a vast panoply of walking, flying, calling, brooding birds, and not all of one species. Magellanic Penguins, Black-backed Gulls, Skuas, Blue-eyed Shags and many more extended in a sprawing avian metropolis of distinct "ethnic" groups as far as the eye could see; a city pervaded by an air of individual responsibility and, to our eyes, confusion.

That we were visiting Punta Tombo was due to an evening of rewarding conversation at the house of our friend Carlos Gutierez. Carlos lives on the edge of Trelew, an important Patagonian town in the state of Chubut. Civilization is sparse in Patagonia, for not everyone has the constitution to endure the incessant wind and in-

credible dust, but it is a polished and generous civilization for all that. Dressed in our best, we arrived at the Gutierez house promptly at 9:30. The Argentine food was delicious and the conversation stimulating, especially when it took a turn that changed all our plans. Among the guests was Sr. Bernardo C. T. Meyer, of Buenos Aires. When he heard that our next photographic objective was penguins but that the nearest penguin colony our research had revealed was fully 500 miles further south, he remarked that he knew of a colony on a small peninsula called Punta Tombo, within two hours' drive of Trelew. Sr. Meyer had himself visited many of Argentina's seabird colonies in recent years, for the guano industry was among his business interests. He proved to be a competent naturalist well stocked with accurate natural history information. Maps were unrolled and plans revised in minutes. Best of all, Carlos agreed to go along as guide on our first trip to the colony, to introduce us to the landowners whose property we would need permission to cross, and to provide an *asado,* a cookout Argentine style.

We left at two o'clock the next afternoon, Carlos leading the way in a battered old Chevrolet with its New Jersey dealer's name still visible on the trunk. The country was arid scrub land, dry thorny bushes growing over exposed shingle. The economy obviously centered on sheep and wool. Birds were few but occasionally a Martineta, that curious crested tinamou which lays polished green eggs, would dash across the road or a Patagonian cavy, startled from invisible immobility, would bounce off with its curiously stiff four-legged hop.

After two hours of our own cavy-like bouncing over the rough roads, we were halted by a gate and sign which read "La Regina." After consulting his map, Carlos led us through the gate and to a fine Estancia surrounded by unusual ornamental plantings, and here we received permission to visit the birds of Punta Tombo. It was nearly five o'clock when we mounted a ridge

overlooking the Atlantic and finally saw Punta Tombo with its great bird colonies extending three miles out into sea.

After the first gasps of appreciation have passed, a great aggregation of wild creatures is likely to impress its human visitors with a strong feeling of timelessness; in the case of penguin colonies, with good reason. Recent investigations in the Antarctic suggest that some present-day penguin colony sites have been established for thousands of years, probably antedating the oldest of existing human cities. As biologists, we were additionally influenced by the specialized knowledge that some of the colonial creatures we watched are little changed from forms which existed before man discovered caves. As thoughts of the continuity of wildlife passed through my mind, Carlos appeared with that ubiquitous evidence of human continuity, an arrowhead, and announced his intention of seeking more while the rest of us reconnoitered the penguin colony.

The colony's appearance and extent were a surprise. Penguins and snow seem synonymous, but here not a patch of snow was to be seen. In fact, many of the birds were nesting at a considerable distance from the sea, underneath the scrubby green bushes which lined the dry gullies of the coastal hills. We estimated that some penguins were nesting at least three-quarters of a mile from the ocean. The weather was windy but not cold, and during our entire camping period the temperature stayed above 45° F. At times it was almost hot and sometimes uncomfortably dusty with the wind driving particles of sand into nose, eyes and, more important, lenses. There was nothing really surprising about finding penguins in such a climate. The seventeen recognized forms have long occupied a broad range in the southern hemisphere, and one species, the Galapagos Penguin (*Spheniscus mendiculus*), is actually equatorial. Directly across the Atlantic from Tombo, the South African coast is the home of large colonies of the Blackfoot Penguin (*S. demersus*), and the Magellanic Penguin (*S. magellanicus*), which we were preparing to photograph, is a relative. It ranges around the tip of South America and even part way up the west coast. Further north on the west side of South America still another penguin makes its home, the Humboldt (*S. humboldti*). All three latter birds are look-alikes and sound-alikes and all are occasionally called Jackass Penguins because of their strong braying calls.

Humboldt and Blackfoot Penguins have been breeding at the Zoological Park for more than twenty years and many hybrids have been produced. I have come to consider that both forms and probably the Magellanic Penguin are but well-marked races of a single species. Blackfoot × Humboldt hybrids are apparently fertile and their calls are so similar that even the birds don't seem to be able to distinguish each other on a species basis. In any event, I was delighted to find that my years of zoo penguin experience would finally be used in the field and readied my photographic equipment. Cameras in hand, Bob, Bill and I made our way slowly toward the shore,

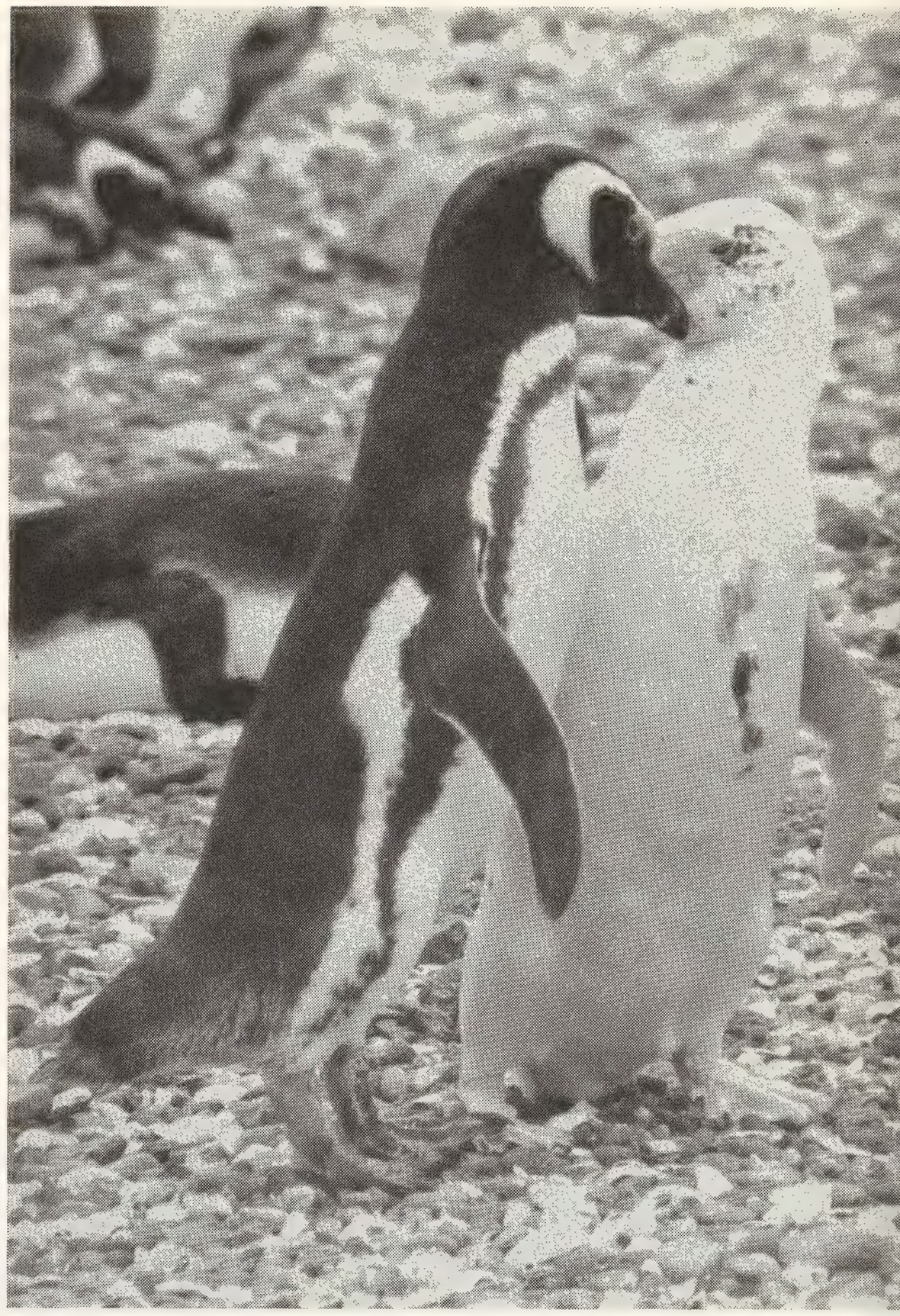
This is only a small segment of the Magellanic Penguin colony at Punta Tombo. Where soil was not suitable for burrows, the birds scraped a nesting hollow under low shrubs, as here.

All photographs by the author.

trying not to frighten the penguins or to be taken by surprise with a sharp jab in the shin. Where soil conditions permit, Magellanic Penguins nest in burrows, and where the soil proves unsuitable the birds make a simple hollow or scrape, often under shrubs. Mournful calls filled the air, Uhhh, Uhhhhh, Uh – ahhhhhhh. Phonetic renditions seem so inadequate! The calls had a chord-like sound and made a curious flat disharmony, but I found myself growing to like them and today the brays of our zoo penguins are a specially reminiscent treat. The sun proved too low to permit movie photography but we contented ourselves with a breathtaking view of birds and water before heading back to the cars and the camp site Carlos had selected.

In succeeding days we fought overcast conditions regularly and even light spates of rain. Our answer was to spend as much time at the colony as the weather permitted (occasionally the wind was so severe that the peninsula was almost uninhabitable), camp out when we could and spend the nights in Trelew when we could not.

When the clouds lifted we hurriedly packed separate knapsacks, planned a three-pronged photographic assault on the birds and went our separate ways. I had chosen a position in the center of the penguin colony well out on the peninsula where there was little vegetation to interfere with pictures and the clayey soil was hard-packed with gravel – and almost snow-colored with penguin excreta. It was a walk of almost a mile and a half to the center of the colony, but as we went into the hubbub made by thousands of active birds our footsteps lagged. Here birds dug nest chambers, there others fed young or fought, preened, displayed, brayed or incubated eggs while still others walked determinedly back and forth from the sea in long, probably food-laden, lines. There was almost too much to see, certainly too much to comprehend. Our early impression of confused chaos was an illusion; everyone (it is almost impossible not to be anthropomorphic when discussing penguins) seemed to have a job and to be devoted to its proper prosecution. It was difficult to concentrate on a single bird. Our problem was the reverse of the usual challenge to observation; we could not see the trees for the forest. Then



we spotted a white penguin, an albino complete except for a few black feathers around its face and its dark eyes. With this proclamation of individualism, penguins emerged as separate entities and we began watching the surprising activities of particular birds.

Our first surprise was that albinism affected quite a few penguins in the colony. In half an hour I had photographed four partial albinos although none as completely white as the first bird we had found. Two of these had chicks which appeared, at least in their downy stage, to be normally colored. We reflected at length on the apparently high incidence of albinism in the colony but, with no figures from other colonies with which to draw comparisons, came to no conclusions. One speculation is that our colony, being rather far north of the body of the Magellanic Penguin population, might represent an isolated and consequently inbred population which could foster an unusual proportion of albinos.

Bob finally took up watch at a sheltered little cove where penguins were bathing and swimming in large groups. Carefully viewing the lighting and camera angles, he sat down and prepared to wait for action of interest. Bill hiked on toward the tip of the peninsula while I cast about for a promising group of penguins with young in the center of the colony.

An opportune spot soon presented itself with seven nests immediately in front of the camera and the colony extending into the distance as background. I arranged my camera and sat down precisely 12 feet from the closest family (as close as my 300 mm. lens would focus). While walking through the colony we had learned that a slow pace with short steps caused little real alarm among the penguins. Quick steps and motions send those without nests fleeing helter skelter, scrambling on their bellies, pushing with flippers as well as feet. Nesting birds give warning huffs and chuffs, twisting their heads from side to side as though to examine us first with one eye and then the other and jabbing threateningly if we approach their nests too closely. I placed my movie camera slowly while nearby nesters eyed me with apprehension and brayed more than usual for a while. When 20 minutes had passed I was an accepted if taboo object in the landscape.

For a while the landscape of penguins held my attention and the very vastness of the colony held my thoughts. How could such seabird colonies develop? Why should they develop? These are fascinating questions for which we do not know all the answers. One necessary condition for colony formation is the immediate availability of an immensely rich food supply. The cold Atlantic waters off Patagonia apparently provide the necessary food just as the cold Humboldt Current on South America's Pacific coast supplies food for the vast seabird colonies off Peru. The few stomach analyses reported for Magellanic Penguins emphasize the bird's dependance on cephalopods — cuttlefish — and

A normally-colored penguin with an albino friend. Four partial albinos were photographed as well as one almost entirely so.

A partial albino with her chicks that seem to be normally colored. An inbred population may explain the number of albinos.

Everything from shallow scrapes to really well-excavated burrows is revealed in this view of part of the colony. Each nest-owner is prepared to defend the area within beak reach.

small sardine-like fishes as well. If food is available, it seems reasonable that seabird colonies might develop on a coast even where suitable nesting spots may be few and far between; especially as similar birds will gather as a result of the same ecological preferences. But colonies might not be so successful if these were their only reasons for existence. After all, birds wishing to live in the same place must face competition for food and nest sites. Surely disease could spread more readily in a colonial species than in a species whose nests are widely separated over much territory. Of course, there is strength in numbers, and security too. It seems likely that large, closely-packed colonies of seabirds would be less subject to predation than smaller aggregations or than single nesting pairs in exposed coastal places. A colony obviously provides more pairs of eyes watching for danger and there is evidence suggesting that group fishing may be more efficient in finding food for some species. Less tangible but just as important is the inevitable stimulation the birds of a colony afford each other.

Mutual stimulation, many zoologists believe, has become so much a part of the biology of some species that they can no longer breed efficiently in small numbers. Evidence has accumulated that communal life may stimulate the birds of a group to eat more than they would if they were alone — a fact every good poultry man knows. This social facilitation is important in bringing male and female to the same point in the breeding cycle at the same time, in sparking courtship behavior and copulation. Ornithologists have found benefits in colonialism in species after species. James Fisher has shown that large colonies of Fulmars are more successful than small ones; Kenneth Williamson has reported that Skuas are more aggressive toward human beings when nesting in colonies than when nesting alone; R. A. Johnson has found that in Atlantic Murre colonies, the greater the amount of fighting, social preening, crowding and calling, the greater the amount of apparent general satisfaction and welfare. In this light, at least, the hubbub in the Magellanic Penguin colony before us made for more sense — and more formality.

Formality comes naturally to penguins. They are dressed for it and they behave within the framework of surprisingly rigid rituals. In fact this ritualization of behavior is the most outstanding feature of life in a penguin colony. Pair formation, nest relief, preening, even fighting,

are all social activities performed by each and every penguin in the same particular way. A Magellanic Penguin would never – well, almost never – think of doing it any other way, and this is a good thing. If you would dwell in a crowded city, you must be prepared to give up certain things. First among these is property. Penguins must be satisfied with very small territories, usually just the entrance to their nesting burrow or scrape and as far around it as they can effectively jab with their powerful beaks. Next, it may be necessary to put up with a bit of petty pilfering, and Magellanic Penguins are great at borrowing twigs or other bits of refuse from neighbors' nests from time to time. Finally, if you are of an aggressive nature, you must somehow find a way to avoid committing mayhem among your species at the inevitable and manifold provocation of neighborly trespass. Magellanic Penguins have only partially solved the fighting problem, I think.

This is a so-called "ecstatic display" of the Magellanic Penguins, a ritual in which birds standing nearby are likely to participate. It is only one element of a complicated ceremony.

Thinking about these matters, I almost missed the chick feeding action I had been waiting for in the penguin family directly in front of my camera. Suddenly the adult with two youngsters, upon which my camera was focused, became active. The old male (I think) straightened himself from his brooding crouch and swallowed several times. The two chicks hopefully began waggling, almost vibrating, their beaks upwards and their parent bent stiffly down to one, expanding his throat and opening his mouth. The chick's head nearly vanished in the opening and much shaking and shuddering ensued. Eventually it withdrew, making swallowing motions, and the process was repeated with the remaining chick. I was unable to see just what the young were getting but evidently they were getting quite a lot. After nearly five minutes of alternate feeding the young were visibly full and uncomfortable looking. Their parent settled down and brooding began again.

While I saw two penguins with three chicks, one or two was the normal number. Chick mortality must be high. Their cadavers litter the colony and many penguins with older families had only one chick. I found penguins incubating eggs here and there, usually two, but there were so many chicks that we figured the main time of incubation must have been past.

Chicks were quiet and unadventuresome on the whole. While frequently begging their parents for food, even the larger ones stayed close to the nest. I saw nothing resembling the large groups or crèches of chicks reported for such penguins as Emperor and Adelie in Antarctica. Crèche behavior is probably less valuable to a species whose chicks can usually retreat from danger into a burrow. Chicks which strayed near other nests were repelled as vigorously as strange adults, and territorial rights, reduced as they were, seemed to be frequent excuse for fighting.

While fighting has been reduced to ritualized form by Magellanic Penguins, the form breaks down from time to time. My attention was first called to fighting as I followed the progress of a penguin returning from the sea and who seemed to be headed toward the area where my camera was set up. With my binoculars I

watched him thread his way carefully between myriad nest burrows, head held high, his steady walk occasionally punctuated by short jumps and runs to avoid the jabs of homesteaders along his way. As he drew within camera range I found myself witness to a strange and apparently senseless behavior. Approaching a particularly narrow passage between two adjoining nests, my bird was attacked with unusual vigor by one of the owners. Jabbing and twisting his head from side to side, the aggressor brought the traveler to a halt. Then, as the burrow owner jabbed again, the traveler met the aggressor's beak with his own in a curious side-to-side head-shaking movement, which had the effect of knocking his beak against that of his opponent. A moment of this and the aggressive bird straightened from his attacking stance and began the same movement. Both birds then stood upright, rapidly and harmlessly "bill-knocking" for all they were worth. Finally losing interest, they parted and the traveler continued on his way. At first I thought this must be some sort of recognition ceremony between mated birds. But further observation showed that the birds which indulged in it were not necessarily a mated or courting pair, although "bill-knocking" is a frequent part of precopulatory courtship. Now I am inclined to think that bill-knocking might be a ritualized fighting pattern which also has its place in courtship. Its social stimulation value was established beyond a doubt when I saw and obtained movies of as many as five birds trying to join in one bill-knocking ceremony. It was ludicrous and looked rather like a football huddle. The advantage of some social ritual in avoiding serious battles in a close-packed bird colony is obvious and it was with considerable surprise that I found that truly serious fights can and do occur.

A sudden thumping following a localized outbreak of trumpeting brays called my attention to the first of these battles. Two birds were scrambling and biting viciously while making chuffing growls. Neither bird was standing. Instead they were swarming back and forth on all fours, hitting with flippers, biting, holding and lunging to bite again, even crashing over nearby nests and bowling over chicks, oblivious of the jabs of surrounding birds. Both penguins had cuts and one was bleeding copiously. I have no idea what precipitated the match but it was certainly serious. I saw several other fights which appeared to be in deadly earnest and in one a contestant appeared to have suffered a damaged flipper.

It was astonishing that so much fighting, brooding, mutual preening and even courtship could take place within the space of a few feet, but courtship was probably the most fascinating and certainly the most amusing activity in which the Magellanic Penguins engaged.

It was easy to obtain excellent movies of courting birds, for they were quite oblivious to the stares of other penguins and zoologists alike. Courting penguins seem to require a certain amount of open space and I never saw serious courtship take place except where a pair had a clear area of at least 12 or 15 feet.

The colony's primary courtship period must have been over, but courtship still took place frequently. It usually started in a small clear area when a male (as diagnosed by a heavier beak, swollen frons and subsequent behavior) approached a female with a curious posturing walk. Waddling forward with flippers slightly extended, he would rigidly arch his head and neck, twisting them to one side and making himself as tall as possible. Then he would walk toward and gravely circle the female with beak down, turning as if to show off his finely contrasting black and white neck and head pattern. She would arch her neck and then, facing one another, both birds would simultaneously straighten, then twist their necks to the other side and back again, and then repeat the circle waddle. Occasionally the ceremony would stop after several switches of neck postures and circle waddles and the male would give vent to loud braying, holding his head high with mouth widely opened and flippers extended. This sometimes produced problems, for other penguins tend to gather near a bird which gives this so called "ecstatic display." Eventually the male would move to the side and behind the female during the circle waddle and begin patting her gently with both flippers. If she was receptive to these ritualized overtures, copulation would follow and then perhaps braying and more neck-arch posturing. While all this sounds grotesque, it certainly seems to work. Though penguins are long-lived –

Like Gulliver among the Lilliputians, Robert Goelet was lying on the beach while penguins crowded close, just before they ran over him.

we have had several for more than twenty years at the Zoo – studies in the wild indicate that some species, perhaps all, tend to be monogamous and to have a surprisingly low "divorce" rate.

The most complete of wild penguin studies are those of L. E. Richdale, who studied the breeding biology of the New Zealand Yellow-eyed Penguin (*Megadyptes antipodes*) for eighteen consecutive seasons. Richdale found that of 577 annual matings, 27% lasted one season, 61% lasted two to six seasons, and 12% lasted seven to thirteen seasons. From a study of 515 pairs Richdale postulated a "divorce" rate of 14%. No one has yet made an extensive study of Magellanic Penguins and we have no way of knowing how closely their habits parallel those of the Yellow-eyed. However, from what we do know, it seems likely that the breeding biology of Magellanic Penguins will be shown to resemble Richdale's birds in many ways.

These reflections and movie photography were interrupted simultaneously as the sun again slid behind the clouds, I decided to see how Bob was doing. When I returned to his inlet, the weather was becoming blustery. At first I could see no trace of him, just his movie camera mounted on its tripod. I was approaching cautiously, not wanting to startle birds he might be studying in a new place, when I spotted a beret surrounded by a mass of penguins on the sloping beach above the rising tide. There, somnolently stretched out on the beach below the beret was Gulliver surrounded by inquisitive black and white Lilliputians gently pecking at his shirt, his trousers and even his alpargatas. It was simply too rare an opportunity to be ignored. So I gradually crept nearer, herding more penguins before me, and at precisely the right moment, as Bob became drowsily aware that something was amiss, jumped and whooped, setting off a small stampede of penguins over the prostrate photographer. Somewhat scraped and soiled, Bob eventually extricated himself and even found the philosophy to wonder "how many people could say they had been run over by a herd of penguins"?

Trudging in from the tip of the Peninsula, Bill Drury joined us at the inlet to watch the penguins coming and going. They like to make group sorties, which display a committee-like indecision about leaving the water. A group of twenty-five or thirty would suddenly organize among the milling swimmers in the inlet and dash for the shore, then stop within a few feet of land and swim hesitantly out into the inlet again. Finally the group would reassemble and swim, as if pursued by devils, out on the beach, scrambling out of the water in a body. Perhaps this group behavior is useful in confusing predators in the shallows, but more likely it is another evidence of mutual stimulation in these highly social little creatures.

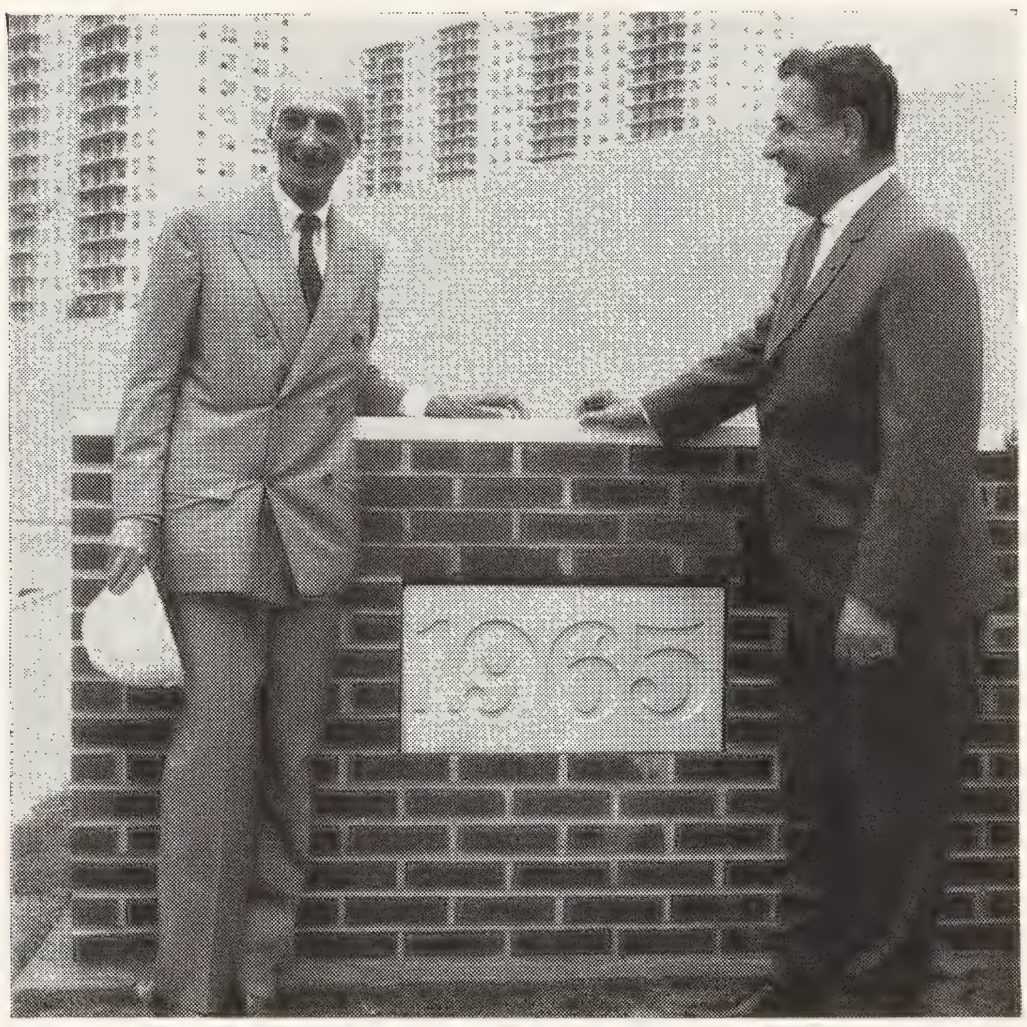
BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Cornerstone-laying Ceremony for Osborn Laboratories

The cornerstone of the $1,250,000 Osborn Laboratories of Marine Sciences at the New York Aquarium at Coney Island was laid Tuesday afternoon, June 29, at a ceremony attended by New York City officials, representatives of government agencies, universities, scientific institutions and trustees of the Zoological Society.

Construction of the laboratories, which are named for Dr. Fairfield Osborn, President of the Zoological Society, was begun in May and should be completed by next summer. The building is immediately adjacent to the present Aquarium.



Dr. Osborn and Dr. Nigrelli stand beside the cornerstone of the new Osborn Laboratories of Marine Sciences, following the ceremony at the Aquarium on the afternoon of June 29.

The dedicatory address was given by Dr. Howard A. Rusk, Director of the Institute of Physical Medicine and Rehabilitation of New York University College of Medicine. He mentioned some of the scientists who have worked at the New York Aquarium since 1902 and said that "of all the public aquariums in the world, the New York Aquarium has made the greatest contribution to scientific knowledge."

Dr. Osborn introduced Dr. Rusk. He spoke of the great potentialities of the new laboratories and their promise for the utilization of the sea's resources. Gifts and grants from public and private sources will enable the Society to advance its investigations rapidly and on a wide front, he said.

Besides the gifts and grants already announced in the July-August, 1964, issue of *Animal Kingdom,* research projects have been underwritten by The John A. Hartford Foundation, Inc., to the extent of $481,000 and laboratory equipment by the Rockefeller Foundation for $150,000.

Dr. Ross F. Nigrelli, the Aquarium's pathologist and Director of Research, will be Director of the Osborn Laboratories.

Among the sixty guests at the luncheon and cornerstone laying were Newbold Morris, Commissioner of Parks; William F. Shea, Director of the Budget; Commissioner Elinor C. Guggenheimer of the City Planning Commission; Dr. George S. Mirick, Scientific Director of the Health Research Council of the City of New York; the Rev. Joseph Mulligin, S.J., Dean of the Graduate School of Fordham University; Prof. L. Edgar Lee of the Department of Pathology of Yale University Medical School; Capt. I. F. Fike, USN, Commanding Officer and Director of the U. S. Naval Applied Science Laboratory; and Laurance S. Rockefeller, Peter Grimm, Peter Gimbel, Augustus G. Paine, II, and David Hunter McAlpin, Trustees of the Zoological Society.

Grants by the Society

Two recent grants by the Zoological Society are of special interest to Zoo people and to all concerned with the conservation of wild animals.

One grant was made to the Wild Animal Propagation Trust to support a program to bring together rare wild animals now existing separately in zoos to give them a chance to mate, and to stimulate a realistic propagation program. The second grant was made to the American Association of Zoological Parks and Aquariums to aid the publication of a basic manual on management of zoos, to be entitled "Zoological Park Fundamentals."

An Unexpected Good Result of the Water Shortage

The water shortage this summer has, naturally, posed serious problems for the Zoological Park, but in the course of living up to the spirit and the letter of the regulations against water use we have made a very clear gain in cleanliness of the Park's roads and paths. We now dry-sweep the paths with a new type of sweeper which, by brush action, forces debris into a covered hopper and does it quickly and completely. Even after a day of very heavy attendance, paths and roads in the center of the Park are usually clean by 9 a.m.

What washing of the roads we do, is done by water drawn from the Bronx River from pumps used by the Sanitation Department to fill its flusher trucks. Flow of water through exhibition ponds has been reduced to a minimum, new ponds at the Kangaroo House have been left dry, no maintenance washing of trucks is being done, and minimum water is being used to clean exhibits. The Rockefeller Fountain and Bird Rock waterfall have been shut off and lawn sprinklers have been discontinued. Some new evergreen planting in the Zoological Park will undoubtedly be lost during the coming winter as a result of water starvation this summer.

"Andy" and "Sandra" Are Now in the Hannover Zoo

The German zoo keeper who had come to New York to take "Andy" and "Sandra," our oldest pair of Orang-utans, to the Hannover Zoological Garden, took one astonished look at Andy.

"This," he said, "is the most important-looking Orang I have ever seen."

His pride in acquiring such a big animal for his zoo helped to lessen the sense of loss the Bronx Zoo staff felt in losing a pair of Orang-utans that have been favorites of staff and public alike for many years. The decision to part with them was not made lightly. When Andy came to us in 1947 he weighed 10 pounds, 13 ounces, and was an amenable, affectionate, appealing little creature with a talent for getting into scrapes.

Although we have exhibited Sugar Gliders (Petaurista breviceps) before, the three recent arrivals from New Guinea can, for once, be seen awake and alert by day in the Red Light Room.

Andy and Sandra

Soon after he arrived he got out of a quarantine compartment in the Animal Hospital, liberated a colony of white mice, broke a score of bottles and flasks in the laboratory and cut his foot in the debris. The bandaging of his injury was one of the highlights of a motion picture we subsequently made for showing at the annual Members' meeting. Later he starred in a picture, "Andy's Animal Alphabet," which has had more sales than any other motion picture we have made.

Unfortunately, Andy could never resist eating and his weight climbed steadily, finally reaching 450 pounds despite our efforts to put him on a diet. In recent years he has been grotesquely fat in our terminology — "important-looking" is only a tactful way of saying the same thing. His companion, Sandra, managed to keep her weight in reasonable proportions, although Andy's habit of summoning her to his side by grabbing a handful of hair and tugging sometimes gave her a ragged aspect.

Andy and Sandra were childless, and since we have hopes of eventual breeding by our four young Orang-utans that are growing up together, and are in need of space in the Great Apes House, there seemed nothing to do but to release Andy and Sandra to another zoological garden where they will be given the best of care, and appreciated. Since they arrived in Hannover, we have had word that they have acclimatized well and are "a tremendous show to the public." That is nice to know, but — well, we shall miss them.

IN BRIEF

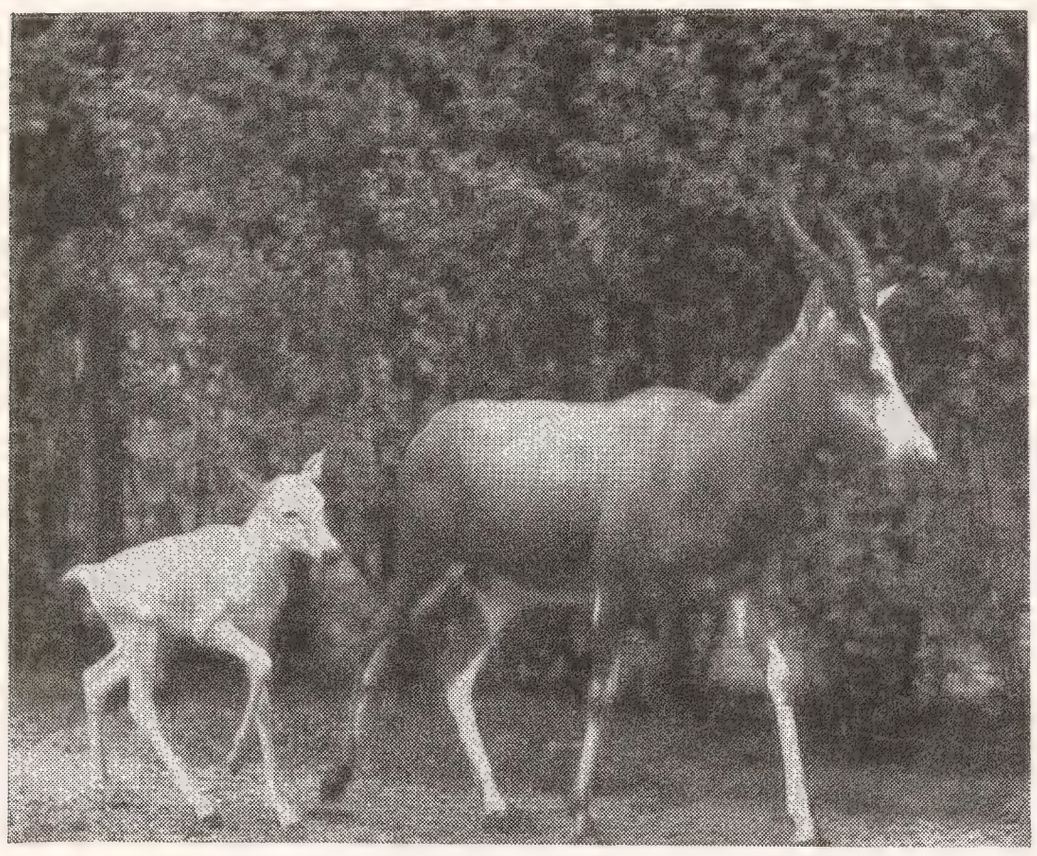
One Cobralet. Of the 24 King Cobra eggs laid on May 18 in the Reptile House, only one finally hatched. A 16-inch cobralet emerged on the morning of July 17 but three other eggs that were obviously fertile did not complete the hatching process. Temporarily the new baby is being kept in the incubator in the Reptile House.

Osborn Book in Gujurati. The Translation Trust of India has been given Gujurati translation rights to Dr. Osborn's book, "Our Plundered Planet," originally published in this country in 1948. It had previously been translated into a number of European languages.

Keeper Robert Mahoney has a round-the-clock job in taking care of "Mr. Moto II," a baby Japanese Macaque being hand-reared.

A Big Egg Basket. Near the end of July, the Bird Department reported that some 1,200 eggs had been collected from exhibits around the Zoological Park. Approximately 1,000 will be incu-

bated and this year, thanks to a new brooder battery of pens in the basement of the Aquatic Birds Building, rearing should be comparatively easy. The pens are designed especially for young ducks and geese and enormously simplify their rearing.



This has been a good year for Blesboks. Five calves were born in June to our herd of seven on African Plains and in the Antelope House.

Good Spring Attendance. In contrast to last year when we, like other New York City institutions, showed a serious decline in attendance, May and June of this year have been extraordinarily good. Attendance at the Zoological Park in May was an all-time record of 443,552, and in June it was 335,306, almost 20% higher than the 10-year average. The Education Department had new records to report in June, with 2,230 classes and organized groups visiting the Zoological Park.

Big Octopus. The Vancouver Public Aquarium has presented a 44-pound Pacific Giant Octopus, *Paroctopus appollyon,* to the Aquarium, and it is thriving in one of the cold-water tanks.

New Pool at Aquarium. The old Tri-pool at the Aquarium has been redesigned by Jerry Johnson, of our Department of Exhibition, and the three shore-marine ecological displays are expected to be completed in early August.

PUBLICATIONS OF INTEREST

EARLY MAN. By F. Clark Howell and the Editors of *Life*. 200 pp., profusely illustrated in color and black-and-white. Life Nature Library, Time, Inc., New York, 1965. $3.95.

The really scientific study of man's origins is only about a hundred years old and new evidence is coming in constantly – see your daily newspaper. Dr. Howell has summarized the findings, from early guesses to today's near-certainties, and gives a running story of the research. The illustrations, as usual in this series, are outstanding.

EUROPE: A Natural History. By Kai Curry-Lindahl. 299 pp., maps, color and black-and-white photographs. Random House, New York, 1964. $20.00.

For most tourists, Europe is the cultural center of the world and few leave the well-publicized routes to historic sites, art centers and pleasure resorts. In this book the Director of Natural History of the Nordiska Museum in Stockholm has left the tourist roads and writes of the wild and natural areas of Europe. And they are worthy of such a careful observer and good writer.

He ranges all over Europe, from the Mediterranean lands to the steppes of Russia, across the deciduous forests to the Atlantic, up the erratic coastline to the northern coniferous forests, the tundra and the Arctic islands.

The superb illustrations have been chosen from the work of Europe's outstanding nature photographers, and have been beautifully reproduced by Swiss gravure. The book is worthy of all praise. – D. R.

THE BIRD WATCHER'S AMERICA. Edited by Olin Sewall Pettingill, Jr. Drawings by John Henry Dick. 441 pp. McGraw-Hill Book Company, New York, 1965. $7.50.

This is a collection of articles by 44 authors on some of the outstanding birding areas in Canada and the United States, including Alaska. Each of the authors, all well-known naturalists, has chosen his or her favorite and best-known area to write about. Although the emphasis is on bird finding there are also interesting and informative accounts of the areas discussed. If you are a lover of the great outdoors, this is the kind of book that can start you planning for your next vacation. – D. R.

THE WRECK OF THE WHALESHIP ESSEX. A narrative account by Owen Chase, First Mate. Edited, with Prologue and Epilogue, by Iola Haverstick and Betty Shepard. Illus. by maps and prints. 124 pp. Harcourt, Brace & World, New York, 1965. $3.00.

The whaleship *Essex* out of Nantucket was sunk by a sperm whale in the Pacific in November, 1820; this is the stout-hearted account of her First Mate of the whale's attack and the subsequent sufferings of the crew in three small whaleboats. Eight out of 20 survived weeks of thirst, starvation, and cannibalism. It is of natural history interest that shortly before the sinking the crew took off 300 tortoises from Hood and 60 from Charles Islands in the Galapagos. First published in 1821, this little book seems to have been at least part of the inspiration for Melville's "Moby Dick."

SHELLING THE SEA OF CORTEZ. By Paul E. Violette. Many drawings by C. Randolph McKusick. 96 pp. Dale Stuart King, Six Shooter Gulch, Tucson, Ariz., 1964. Cloth, $3.00; paper, $1.50.

A beginner's guide to shells in the Gulf of Lower California. Briefly describes many common and not-so-common shells, advises on likely locations, best time for collecting, and collecting by snorkel and SCUBA diving.

THE ANIMAL KINGDOM. By Robert T. Orr. 380 pp., many photographs in color and black-and-white. The Macmillan Co., New York, 1965. $9.95.

A smoothly-flowing survey of the animal kingdom from one-celled animals to the mammals, by the Associate Director of the California Academy of Sciences. About half the book deals with the chordates, so treatment of the better-known animals is necessarily brief. Non-technical and interspersed with the author's personal observations.

New Members of the New York Zoological Society

(Between May 1 and June 30, 1965)

Associate Founder
Sydney S. Spivack

Life
James Donahue
Anthony D. Marshall
Peter Matthiessen
Raymond S. Rubinow
Mrs. Hsio Wen Shih

Supporting
Mrs. Henry B. Coakley
Charles H. Erhart, Jr.
Mrs. Alexander S. Haig
Miss Bertha Hernstadt
Mrs. H. Irgens Larsen
John D. Soutter
Daniel W. Stroock

Contributing
Newell G. Alford, Jr.
Lester A. Barrer
Mrs. Francis L. Blewer
Mrs. E. S. Boegehold
John A. Boyle
Seymour Britchky
Gregory N. Camp
Mrs. Cass Canfield
Mrs. Disque D. Deane
Miss Elizabeth Derfner
Casimir De Rham
Mrs. Lilian L. Dolby
Mrs. Florence R. Ferguson
Irving S. Gordon
Fred Gwynne
George Hampton, Jr.
Sidney A. Hessel
Robert L. Hollins
Walter Kaplan
Miss Brenda Kuhn
Robert A. Lehman
Mrs. Lillian Leibowitz
Frank O. Lindemann
Anthony Lo Fromento
Mrs. E. Townsend Look
Mrs. William B. McWhirter
Edgar T. Mead, Jr.
Mrs. C. Roger Meeker
Manro T. Oberwetter
Miss Alice J. Purcell
James F. Reilly
Miss Mildred Roe
Mrs. John A. Roebling
Joseph L. Rosenmiller, Jr.
Norman Saul
David Scherer
Mrs. G. McKay Schieffelin
Mrs. Anita E. Seits
Mrs. Charles H. Seydel
Charles Louis Smart
Mrs. F. J. Starzel
Peter Stephaich
Mrs. Thomas W. Swan
Henry W. Toll
Mrs. John N. Trainer, Jr.
Mrs. Sumner B. Welles
Herman Werner
Mrs. Faith A. Witter
Mrs. Burson Wynkoop

Annual

Mrs. Walter Abel
Mrs. Donald J. Amoruso
Mrs. Cleveland Amory
Mrs. Alice I. Audrieth
Miss Peggy Baird
Mrs. Robert A. Barrett
Mrs. Theodore Baumgold
Mrs. Evelyn Blackmer
Dr. David I. Blaustein
Rabbi Louis Blaustein
Otto R. Bosse
Perry Boxer
Harold N. Braunhut
Harold Brody
Dr. Milton Budnick
Miss Vera H. Burck
Gene Burke
Miss Sally Chapman
Mrs. J. L. Christy
Miss Libby R. Cohen
Thomas R. Cox
Alfred De Kupsa
Francis Donaldson
Dr. Lee Firester
Mrs. Robert S. First
William T. Fox
Robert M. Fromm
S. W. Gage
Mrs. Isabel Garfinkle
Louis F. Geissler
Miss Cecilia E. Gelfman
Salvatore J. Gianfortune
Dr. Mark Golden
Mrs. Agnes Goodhart
Allan A. Greenberg
Mrs. Steven Gutman
Mrs. Ida F. Haas
Russell H. Hagerman
Mrs. John N. Hazard
Thomas J. Heffernan
Mrs. Herman Isacs, III
Frederick L. Jacobs
Gerald James
Dawson M. Jay
Philip Kalfus
Barney Kanan
Arnold Kaye
Mrs. R. F. Kennedy
Mrs. E. H. Kenyon
Conway E. Kuhlmann
Alfred J. Land
Mrs. Forbes Lapp
Mrs. G. Douglas Lawrence
Mrs. William V. Lawson
David Lean
Mrs. Morton Lippman
Mrs. Ralph Lowell
Ralph Lowell
George Marcus
Bert J. Matzner
Miss Alice B. McReynolds
Waring O. Mellick
Mrs. Matthew A. Meyer
Miss Gladys Gloria Moffett
Mrs. Arthur G. Moss
Mrs. Emily Mullen
James Murray
Samuel Nelkin
Mrs. Robert A. Newman
Mrs. Conrad N. Normann
Carl W. Olson
Miss Ida M. Paghense
Mrs. Norman B. Paley
Morris L. Pegler
Mrs. Florence J. Phillips
Mrs. William Poll
Robert Ogden Purves
V. D. Rider, Jr.
Mrs. James J. Rorimer
H. H. Ross
Mrs. Joseph J. Sausa
Sam Schaffer
Joseph Schwab
Mrs. Alma K. Seppa
Michael Shaw
Mrs. Wilfrid Sheed
Mrs. Joseph Sherry
Kalman Small
Sam Sonuston
Bernard F. Steiner
Mrs. Arnold H. Stotter
William D. Strong
Mrs. Pauline C. Waldburger
John A. Willis
Mrs. Madge Wilson
Nicholas H. Witte
Milton H. Wollman
Stanley Workman
Mrs. William Yarrow
Seth Irwin Youdelman
Barry Zeitlan

Intimate contact with
small animals delights
Members and their children
at special parties in
the Bronx Zoo.

Wouldn't you like to be
a Member and share in the fun?

Write to:
Membership Department,
New York Zoological Park,
Bronx, N. Y. 10460

Actually touching an amenable
Spectacled Owl makes the high
point of this boy's day at the Zoo.
Introduction — and interpretation —
are the special province of our
Education Department's talented
Zoology Instructor, Mrs. Inger Bradbury.

But everybody, adult and child,
loves close contact with small,
handleable wild animals. Here, at
the Garden Party, Miss Michelle Perrault
carries Mr. Moto, a rambunctious
Japanese Macaque, around a ring of
Members at the Garden Party.

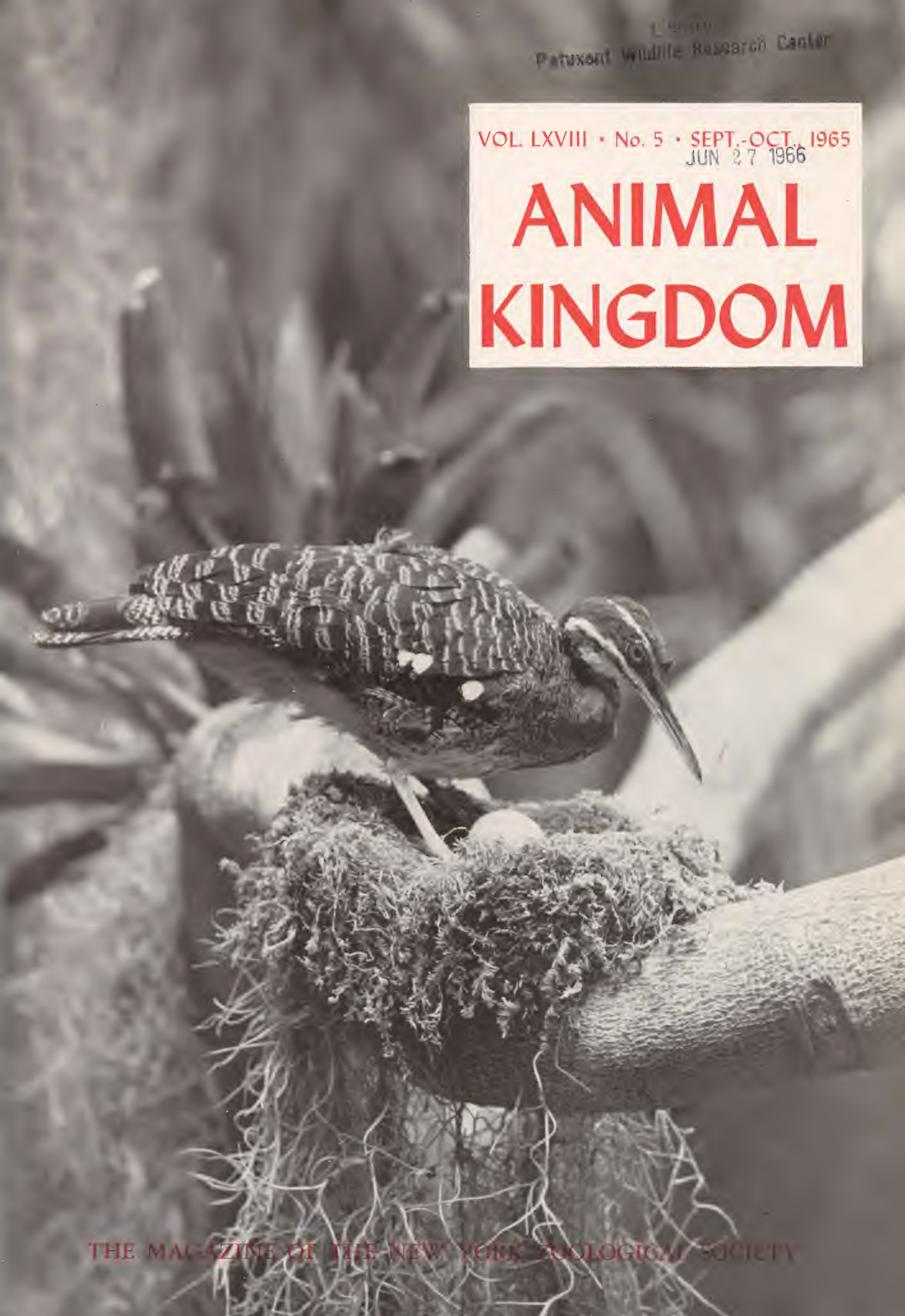
NEW YORK ZOOLOGICAL SOCIETY

Library
Patuxent Wildlife Research Center

VOL. LXVIII • No. 5 • SEPT.-OCT., 1965

JUN 27 1966

ANIMAL KINGDOM



THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

NEW YORK ZOOLOGICAL SOCIETY

General Offices: 630 Fifth Avenue, New York, N. Y. 10020

PRESIDENT Fairfield Osborn

VICE-PRESIDENT Laurance S. Rockefeller

SECRETARY John Elliott

TREASURER David Hunter McAlpin

ASSISTANT TREASURER Eben W. Pyne

EXECUTIVE COMMITTEE

Laurance S. Rockefeller
Chairman
George F. Baker, Jr.
John Elliott
Henry Clay Frick
Peter R. Gimbel
Robert G. Goelet
John N. Irwin, II
David Hunter McAlpin
Fairfield Osborn
John Pierrepont

Ex-Officio:

The Mayor of the City of New York, Hon. Robert F. Wagner

The Commissioner of Parks, Hon. Newbold Morris

BOARD OF TRUSTEES

Class of 1966
Robert E. Blum
William R. Coe
C. Suydam Cutting
Henry Clay Frick
Anthony D. Marshall
Otto Marx, Jr.
David Hunter McAlpin
G. W. Merck
Augustus G. Paine, II
Richard C. Patterson, Jr.
John H. Phipps
Alfred G. Vanderbilt

Class of 1967
Alexander Aldrich
George F. Baker, Jr.
John Elliott
Robert I. Gannon
Peter Grimm
Fairfield Osborn
Eben W. Pyne
Laurance S. Rockefeller
John M. Schiff
Henry Sears
Joseph A. Thomas
Robert Winthrop

Class of 1968
Charles W. Engelhard
Peter R. Gimbel
Robert G. Goelet
John N. Irwin, II
Warren Kinney
Peter N. Matthiessen
Howard Phipps, Jr.
John Pierrepont
David T. Schiff
Chauncey Stillman
Landon K. Thorne, Jr.

STAFF: Zoological Park, Aquarium & Other Society Activities

William G. Conway . . . . *Director, Zoological Park*
Paul Montreuil . . . . . *Director, Aquarium*
John Tee-Van . . . . . *General Director Emeritus*
Christopher W. Coates . *Director Emeritus, Aquarium*

ZOOLOGICAL PARK

Joseph A. Davis, Jr. . . . . *Curator, Mammals*
H. Bradford House . . . *Assistant Curator, Mammals*
Grace Davall . . *Assistant Curator, Mammals & Birds*
Roland Lindemann . . . . . *Consultant in Mammal Management*
William G. Conway . . . . . *Curator, Birds*
Joseph Bell . . . . . *Assistant Curator, Birds*
Herndon G. Dowling . . . . . *Curator, Reptiles*
Victor H. Hutchison . *Research Associate in Herpetology*
Allen Vinegar . *Visiting Research Fellow, Herpetology*
Charles P. Gandal . . . . . *Veterinarian*
Gordon Cuyler . . . . . *Membership Chairman & Administrative Associate*
Herbert J. Knobloch . . . . . *Curator, Education*
Jerry M. Johnson . . . *Designer, Dept. of Exhibition*
Charles B. Driscoll . . . *Superintendent, Operations*
Edward Kearney . . . . *Manager, Facilities Dept.*
Lee S. Crandall . . . . *General Curator Emeritus & Zoological Park Consultant*

AQUARIUM

Carleton Ray . . . . . *Curator*
Joseph R. Geraci . . . . . *Associate Curator*
Jewell Bungay . . . . . *Business Manager*
Louis Mowbray . . *Research Associate in Field Biology*
Aage Olsen . . . . . *Superintendent*

OSBORN LABORATORIES OF MARINE SCIENCES

Ross F. Nigrelli . . . . . *Director and Pathologist*
C. M. Breder, Jr. . . *Research Associate in Ichthyology*
Harry A. Charipper . . *Research Associate in Histology*
Thomas Goreau . *Research Associate in Marine Ecology*
Sophie Jakowska . . . . . *Research Associate in Experimental Biology*
Klaus Kallman . . . . . *Geneticist*
John J. A. McLaughlin . . . . *Research Associate in Planktonology*
George D. Ruggieri, S.J. . . . *Research Associate in Experimental Morphogenesis*
Martin F. Stempien, Jr. . . . . *Research Associate in Bio-Organic Chemistry*

GENERAL

Walter Lerchenfeld . . . . . *Comptroller*
Harold C. Palmer . . . . . *Assistant Secretary*
John J. McKew . . *Personnel Manager & Assistant to the Director, Zoological Park*
William Bridges . . . . . *Curator, Publications*
John L. Miller . . . *Associate Curator of Publications*
Dorothy Reville . . . . . *Editorial Assistant*
Sam Dunton . . . . . *Photographer*
Henry M. Lester . . . . . *Photographic Consultant*
William H. Eddy, Jr. . . . . *Associate in Education*

DEPARTMENT OF TROPICAL RESEARCH

Jocelyn Crane . . . . . *Director*
Michael G. Emsley . . . . . *Assistant Director*

Associates

Jane Van Z. Brower
Lincoln P. Brower
William G. Conway
Julie C. Emsley
William K. Gregory
Donald R. Griffin
David W. Snow
John Tee-Van

AFFILIATE

L. Floyd Clarke, *Director*
Jackson Hole Biological Research Station

ANIMAL KINGDOM

Bulletin of the New York Zoological Society

In This Issue

Sun Bittern: the Egg and the Nest
Sam Dunton **Front Cover**

—and Then the Chick
William G. Conway
Back Cover

It's a Great Year for Rarities
Joseph A. Davis, Jr. **130**

A Close Look at Argentine Wildlife
William G. Conway **134**

They Learned About Animals by Work and Research
William Bridges **141**

Zoo News in Pictures
Sam Dunton **143**

Housekeeping for Marine Iguanas
Ray Pawley **146**

The Weddell Seal at Home
William E. Schevill **151**

We All Ritualize Our Behavior Sometimes
Jocelyn Crane **155**

Behind the Scenes **156**

Vol. LXVIII OCTOBER 1965 **No. 5**

Issued bi-monthly by the New York Zoological Society at the New York Zoological Park, Bronx Park, Bronx, N. Y. 10460. Editorial and Subscription Offices at the same address. Title registered with United States Patent Office • Subscription, $3.50 a year; single copy, 60 cents. Same rates for all foreign countries and Canada. Second-class postage paid at Bronx, N. Y. Send Form 3579 to Bronx, N. Y. 10460.

The Timing Was Ideal

IT SO HAPPENED, seventeen years ago, that our Society launched and sponsored an affiliate whose purpose was to advance understanding concerning man's relationship with nature. More specifically, the task of this new organization was to emphasize the urgent need of conserving and properly using the resources of our earth — animal life, plant life and water. The concept behind this action was that all living things are interdependent and that man, for his own best welfare, must avoid the destruction of other forms of life. Time makes this concept ever more valid.

The phrase above — *it so happened* — may imply that the creation of this new organization, The Conservation Foundation, was to some degree an accidental one. An observant scientist once remarked that most notable discoveries were "accidental." In any case, the timing for this launching proved to be ideal. Our nation had within the century witnessed two great conservation "movements," one initiated by Theodore Roosevelt and Gifford Pinchot in the first decade, to protect our forests and preserve our vanishing wildlife; the second, taking form in the 1930's, was primed by the dustbowls that were ravaging our agricultural lands. Then came a decade of warfare — the Second World War and our nation's subsequent involvement in the Korean War — ten years when man was intent on destroying other men. When these two compelling national emergencies were concluded the moment had come to halt the harm being done by man upon nature itself.

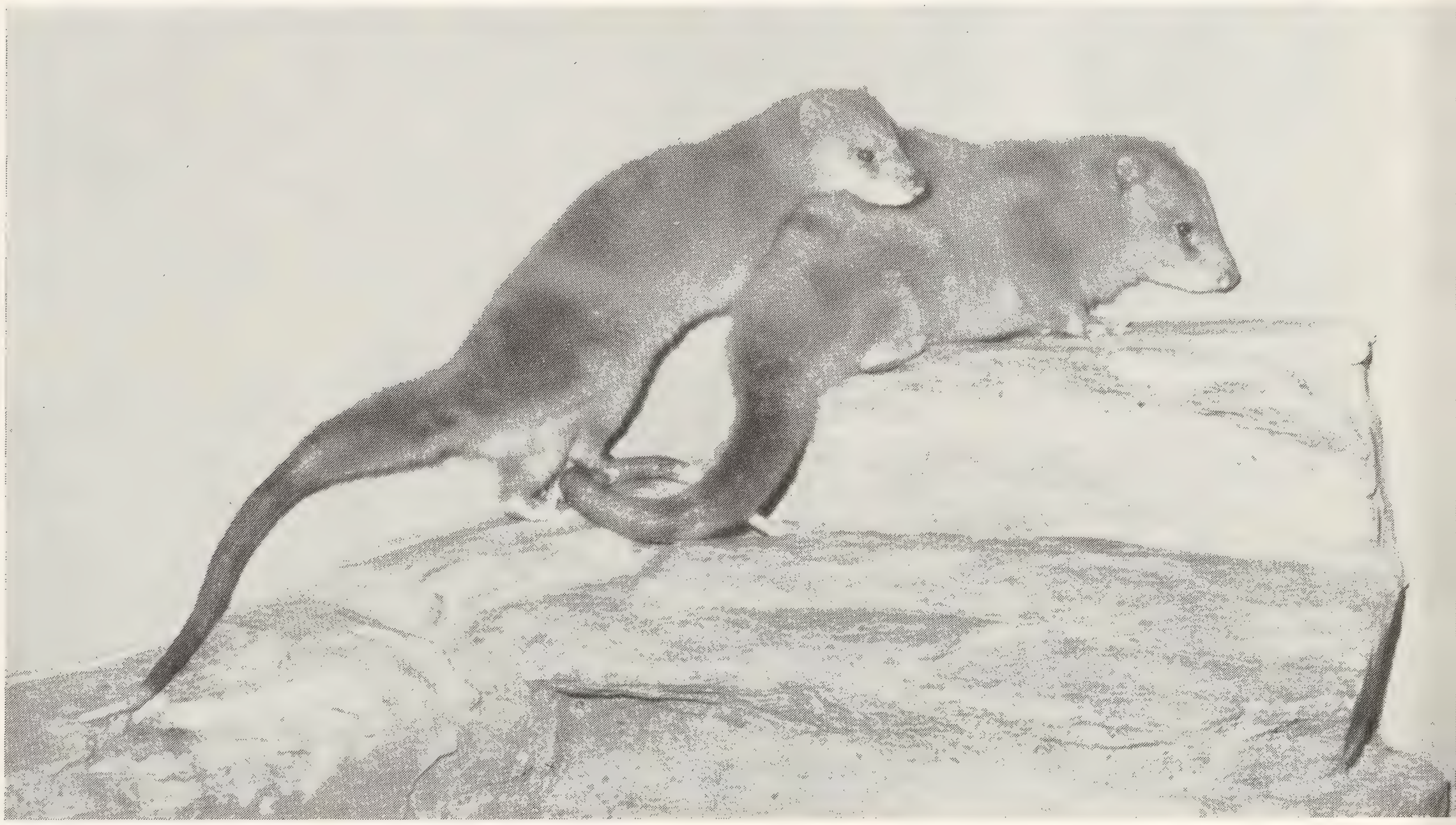
It soon developed there was great need for an organization such as The Conservation Foundation, then the first of its kind, dedicated solely to education and research. There are those who encouragingly say that the Foundation, through its research studies, publications, educational and related activities, has contributed significantly to the present evergrowing conservation movement in our country. Each year its work grows in vitality. Each year new opportunities for accomplishment present themselves.

The Foundation's headquarters have now been moved to Washington, providing a new scene for action.

Our Society is justified in feeling genuine satisfaction that it played such an essential part in bringing The Conservation Foundation into existence.

Fairfield Osborn

IT'S A GREAT YEA



Thick-tailed Opossums may not at a glance appear very opossum-like, but there is no mistaking the thick-tailed part of their name. Ours are able to swim, but do not seem to enjoy being in the water.

IF A MAMMALOGIST were to draw up a roster of the creatures he would most like to see in a Small Mammal House, his list would include a number of species known to most persons only as names — and several whose very names would meet with blank unrecognition. These are the rare beasts that almost never turn up in a zoological park, and of which very few museums can boast. Most of these animals that excite a curator's cupidity are small and found in inaccessible places. To make matters worse, they are in the main nocturnal, so that even when one did arrive, it made a poor exhibit for the general public, the kind of animal a curator might flush from its nest box for a visiting colleague to see. Of course, the last problem no longer exists; our pioneering red-light reversal technique, which has now been widely adopted in this country and elsewhere, has removed the obstacle of darkness as a factor in exhibition. All that stands in the way of having the most desirable species now is the difficulty in obtaining them.

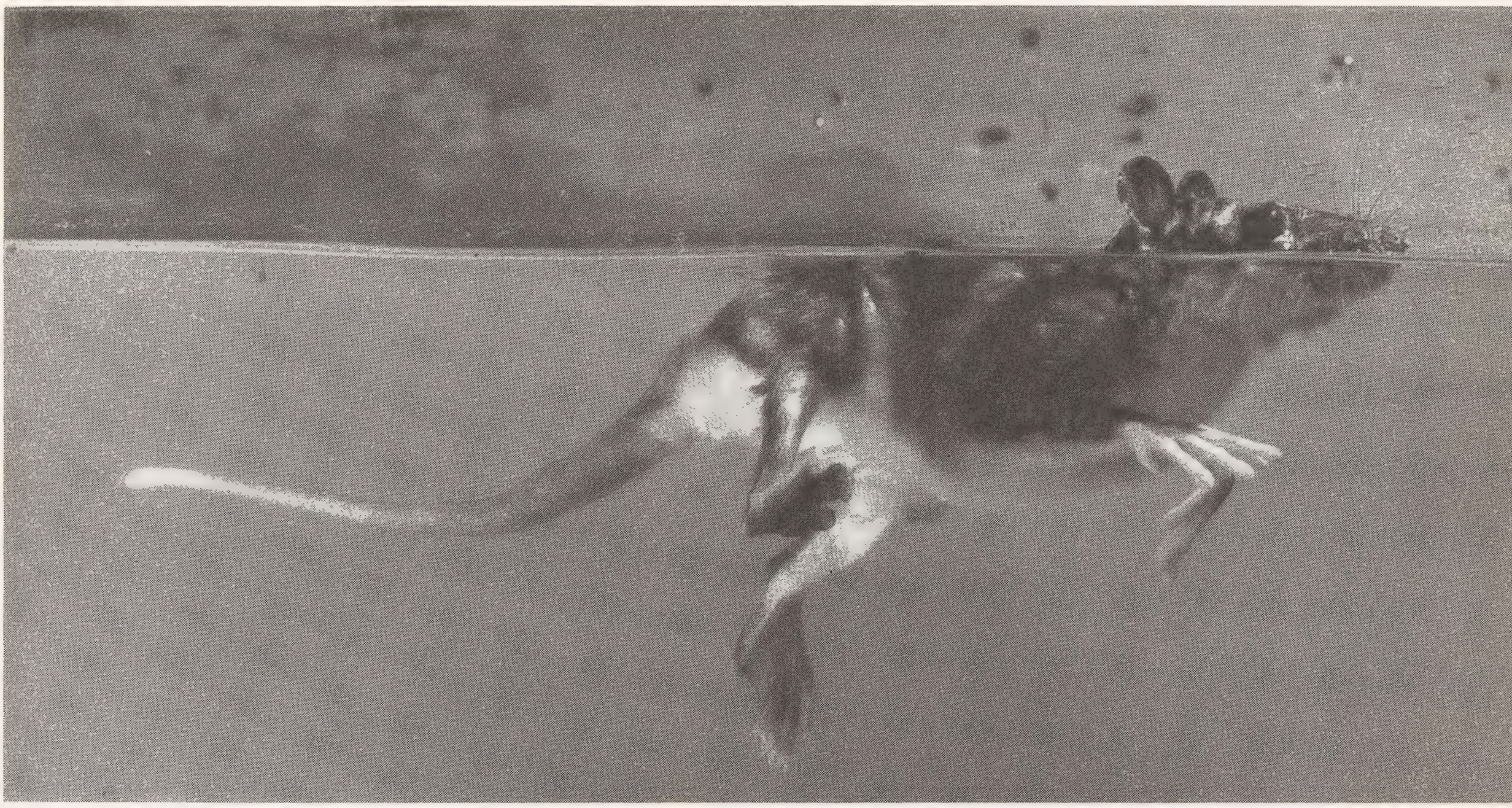
All that *stood* in the way, I might have said. For in the past few months some figurative floodgate has opened and the New York Zoological Park has seen an unbelievably steady parade of arrivals at the Small Mammal House; some species we have had rarely, and only in the pre-red era, and others were never before represented in our collection, or in this country — or anywhere else. These, together with other rare old-timers, now make the census of the Small Mammal House read like a dream come true.

The roster I give here is a mere list and is not in any special order of importance. Some of the species will be more fully covered in future issues of *Animal Kingdom*.

The Coligruezo or Thick-tailed Opossum (*Lutreolina crassicaudata*) is a reddish opossum that

FOR RARITIES

By JOSEPH A. DAVIS, JR.
Curator of Mammals



The Yapok, alternatively named Water Opossum, is a much more aquatic creature than the Thick-tail. It swims with the greatest ease, dog-paddling from one end of its big tank to the other.

ranges from the Guianas to Argentina. It seems to be fairly well known, but is rarely seen alive outside of South America. It is primarily a flesh-eater, and is said to take not only the small terrestrial vertebrates in its habitat, but aquatic creatures as well. Although it is reputed to swim expertly, its feet are not webbed. Our pair, which arrived here on July 15, are about the size of a mink and built along the same sinuous lines. Mink-Opossum would not be an inappropriate name. Even the head of the Coligruezo is unlike that of any other New World opossum, having the general appearance of a weasel's head, or that of a mongoose. The marsupial identity of the Coligruezo is given away by the female's pouch and the typical elongated haunches of both sexes.

Two Yapoks (*Chironectes minimus*) from Peru were received on June 18, and one has been placed on exhibition in the Small Mammal House. Because we do not expect them to live together peacefully, the second Yapok presently resides in the old platypusary in the Lion House basement. Only two Yapoks have reached any zoo before; we had both of them. The first came in 1947 and lived 102 days. The second arrived in 1949 and lived nearly 3 years but, because of its nocturnal habits, was never exhibited. The Yapok is the only truly aquatic marsupial and is a strong swimmer, propelling itself with its webbed hind feet.

The Black-shouldered Opossum (*Caluromysiops irrupta*) is so rare that only two specimens were known (both in the Chicago Natural History Museum) from the time of its discovery in the region of Cuzsco, Peru, in 1950, until we received two females in 1962 and 1963. One of these, the first, is still living. Nothing is known about its habits in the wild.

Sugar Gliders (*Petaurus breviceps*) from

New Guinea, the marsupial version of our familiar flying squirrel, are not often seen in this country. Our trio came as a gift from Dr. Thomas Schulze-Westrum, of the University of Munich. We have had these interesting little phalangers before, but only now can we show them awake and alert, thanks to the red light quarters.

Angwantibos or Golden Pottos (*Arctocebus calabarensis*) are little-known relatives of the Common Potto, slenderer in build and with longer, more pointed snouts. The three now in the Small Mammal House are a gift of Robert Bateman, a Canadian who has lived in eastern Nigeria for several years and is about to return to his own country. These are the first Angwantibos to arrive in the United States.

Four Demidoff's Bushbabies (*Galago demidovii*) also came from Mr. Bateman. Although they are not really rare in zoological collections, they are the first to arrive here in good health, with a fine prospect of surviving. These four miniature versions of the common Senegal Galago are alert, active and accustomed to people, and from an exhibition point of view are favorites because they are almost always doing something.

Variegated Squirrels (*Sciurus variegatoides dorsalis*) from Central America are not particularly uncommon animals, but our young pair are the first to be represented in our collection. Apart from the fact that they are among the most attractively colored of the world's squirrels, their chief claim to fame is that they can be identified in life primarily because their color patterns are so variable that no description will suffice for more than a few individuals from any single locality.

Not one, but three Hispaniolan Solenodons (*Solenodon paradoxus*) reside in the collection.

The Black-shouldered Opossum of Peru is one of the rarest mammals we have exhibited. It has been shown only twice before, both times here.

The Common Potto of central Africa is often exhibited, but we now have the Golden Potto for the first time in America. It is small, slender, slow.

When Drs. Edwin Gould and John Eisenberg of Johns Hopkins and Maryland Universities ordered these rare insectivores from an animal dealer, they asked if we would meet the animals at the airport, feed and water them and hold them until they could be called for. We readily agreed. Now, their behavioral studies completed, the two zoologists have turned the animals over to us.

A family of Common Tenrecs (*Centetes ecaudatus*) and a group of Small Hedgehog-tenrecs (*Echinops telfairi*) also came from Dr. Gould several years ago. He had collected them in Madagascar, along with a number of Large Hedgehog-tenrecs (*Setifer setosus*), and under an arrangement similar to that of the solenodons, Dr. Gould presented us with specimens of the latter, too.

Also new to our collection are a pair of Small-toothed Palm-civets (*Arctogalidia trivirgata*) born in the San Diego Zoo of parents collected in Borneo.

The Giant Otter (*Pteronura brasiliensis*) of South America is not often seen in captivity, although over the years many of the larger zoos have had specimens. Most of them prove to be short-lived, but our female, Suzie, has been with us since February, 1955, having long ago set the longevity record for the species. She is a favorite of the keepers in the Small Mammal House, and one of the few occupants of that building allowed the run of the service corridor while her enclosure is being cleaned each day.

The Small Malayan Chevrotain, or Mouse-Deer (*Tragulus javanicus*) is not at all scarce in the forests of southeast Asia, but is rare in zoological collections. Our pair, since their arrival in September, 1961, have increased, by breeding, to 16. We have learned much in four years about their reproduction and behavior, and are now well on the way to having a self-replenishing breeding group.

These are but the cream of the Small Mammal House census, as it stands today. Other species, less infrequently seen but not less interesting, reside or have resided recently in the building. Mountain Beaver, or Sewellel, from the Pacific Northwest, Springhaas from Africa, Olingos from South America, Tamanduas and Pangolins, difficult ant-eating creatures that have done well here, and a veritable Methuselah of a Silky Anteater that at its death had outlived the previous holder of the longevity record by nine times — the list is a long one.

What the future holds in store is anyone's guess. There are many more species that we would like to see in the collection, but for now we have as fine a representation of small mammals as can be seen anywhere, and if nothing extraordinary should turn up for a while, we won't be too disappointed. We can make good use of our time in studying the animals now here.

Demidoff's Bushbabies are not rare members of zoological collections, but their alert and active nature makes them a favorite of many visitors. They are well accustomed to people.

A Close Look at Argentine Wildlife

By WILLIAM G. CONWAY

Director, Zoological Park

All photographs by the Author

ANY NATURALIST who spends enough time in the field is bound to have unusual experiences with wild creatures. I remember the time in southern Illinois when a large Canebrake Rattlesnake quietly coiled around my camera case while I was photographing one of his colleagues, and the time a Ruby-throated Hummingbird made a deliberate examination of my shirt buttons, one by one. But an experience that was at once the most delightful and the most extraordinary of such adventures occurred on last year's expedition to Patagonia. It concerned a Guanaco.

At the time, Dr. William H. Drury of the Massachusetts Audubon Society, Zoological Society Trustee Robert G. Goelet, and I were nearing the end of our Argentine Wildlife Expedition* and were driving from Trelew to the great nesting colonies of Magellanic Penguins and other birds at Punta Tombo. Our friend and guide, Sr. Carlos Gutierez, had suggested that we be on the lookout for Guanacos, since the wildlife of the area was relatively undisturbed and herds might be encountered anywhere.

Within minutes after we left the estancia "La Regina" we saw them – two fine herds, one of 13 animals. Our previous efforts to photograph the Guanaco, thought to be the wild ancestor of the domestic Llama, had been only partly successful, and at first it appeared that this one would be no more so. Stopping abreast of a herd only 200 feet away, Bill and I tried to slip out of the car quietly with all our gear – telescopic lenses, movie and still cameras, light meters and tripods. It was no use. Just as Bill finished setting up "the Baby," his necessarily clumsy 600 mm. lens, the herd male gave a coughing whinny and the Guanacos drifted silently over the brow of the hill. There are few occupations more futile than pursuing a herd of wild Guanacos afoot, and so we packed up and drove on. Here and there we found the gray-brown piles of dung which constituted Guanaco latrines and sign-

---

* Counting Elephant Seals on Punta Norte. By William G. Conway. *Animal Kingdom,* Jan.-Feb., 1965.

Apartment-building and Cliff-dwelling Parrots. By William G. Conway. *Animal Kingdom,* March-April, 1965.

The Penguin Metropolis of Punta Tombo. By William G. Conway. *Animal Kingdom,* July-Aug., 1965.

Argentine Guanacos are rarely within distance for a close-up picture. This youngster was an exception, coming closer and closer until Dr. Drury couldn't even move to focus his camera.

posts, and probably territorial markers as well, but our chances of making close-up pictures seemed dim until we spotted a young Guanaco on a nearby hillock.

Bob braked quietly and Bill and I slipped out again. Bill took a short establishing shot with the movie camera and began stalking stealthily forward. I snapped a still picture and followed. We advanced nearly forty feet and still the little Guanaco held his ground. Bill's camera whirred, mine clicked and then, one foot after another, slowly, slowly, we inched forward. In five suspenseful minutes we had gained perhaps twenty feet when the little Guanaco turned directly toward us and took a few steps. We froze, planted our tripods, and waited. It was moving toward us! Hesitantly but inquisitively it came on, and on, and on.

"He's so close I can't focus!" Bill whispered.

With a smaller camera I was more mobile. Bill stood like a rock and I felt my way backward until, finally, I was at sufficient distance to take an incredible picture of a wild Argentine Guanaco —and an even wilder, because frustrated, photographer — side by side.

Eventually the baby turned and went away.

OCTOBER 1965

The remains of an evening meal were the apparent attraction one morning for a Patagonian Fox, who stood by while his picture was hastily taken.

What innocence, what over-developed bump of inquisitiveness, impelled the little animal to approach so confidently we shall never know, although we speculated that, since it was probably less than three weeks old, its parents might have left it. In any event, it is unlikely that ever again will I be all but nuzzled by a wild Guanaco.

While we were camping on Punta Tombo to study and photograph the Magellanic Penguins, I awakened at 6 o'clock one morning to speculate about the sounds around me. There were raucous penguin calls, a distant seedsnipe's voice, the whistle of a Crested Tinamou, and something else, a strange sound that had awakened me. A snorting whinny; it could only be a male Guanaco. Unzipping the tent front, I managed to glimpse him as he turned and vanished over a nearby ridge. Carlos was already up and he pointed without speaking. There, perhaps thirty feet away, stood a Patagonian Fox, evidently attracted by the remains of our evening meal. He showed remarkably little fear and stood watching as I set up my camera for a few hasty pictures.

The end of our penguin work coincided with the return of Bill Drury from gull and cormorant colonies further out on the Punta Tombo peninsula and when weather permitted we determined to visit them—a matter of a three- or four-mile

Nesting Black-backed Gulls were seen only 30 feet from the penguin colony. A Black Oystercatcher seemed out of place. At right — nestling baby gulls.

walk to the tip of the point. We tried a new route through the penguin colony in order to annoy as few birds as possible but soon found ourselves in an area more crowded with nest burrows than any we had seen. Sidestepping to avoid one nest burrow, Bill plunged through the top of another and hoarse huffs and brays seemed to come from all sides. I am sure I have never felt so unpopular. Our "detour" through the colony took on the appearance of a harried retreat as we tried to move slowly yet agilely enough to avoid being jabbed. We found our first patch of nesting gulls still within the limits of the penguin colony.

Eleven pairs of Black-backed Gulls (*Larus marinus dominicanus*) held a small group of nests which stood out like an island in a sea of penguins. A "No Bird's Land" of nearly thirty feet separated the two species. The big gulls, a race of the "Black-backs" common along the New England coasts (and a regular visitor to the Bronx Zoo), range around the world in the southern hemisphere. Noting a freshly killed penguin chick carcass near the nests, we took a few pictures and pushed on toward the main gull aggregation in the distance.

Between the straggling borders of penguin and gull colonies lay perhaps half a mile of sand and rock with nests here and there of both species. It was a bleak and inhospitable area, with the distant screams of gulls and the brays of penguins rising and falling in volume in response to the buffeting of the wind. The clouds were very gray, though fragments of blue could still be seen, and it was in this especially desolate area that we met our first nesting Skuas.

Skuas are big, brown, hawk-like relatives of the gulls. Heavy and chunky in appearance and determinedly aggressive toward man and beast, their wind-whistling stoops in defense of chicks or nest are not to be ignored. A Skua has a wingspread of nearly five feet, and an established reputation as a voracious killer of any small bird or mammal it can overpower. It is particularly notorious for robbing seabirds. Chasing on the wing such species as cormorants until they disgorge their catch, the Skua dives and scoops up the meal before it hits the water. Where there are penguin colonies, usually there will be Skuas breeding in loose aggregations on the edge and feasting on chicks and eggs left momentarily unguarded. Although Skuas constantly beat back and forth across this penguin colony, we did not actually see them preying on the bird's nests, but we did see gulls mobbing Skuas on more than one occasion. I suspect that the burrow-nesting habit of Magellanic Penguins is a better Skua defense than that of species of penguins which nest in the open. Perhaps gulls were the Skuas' principal victims at Tombo.

As we walked through the Skuas' area toward the first of the big gull concentrations, one bird got up from the ground some distance away and

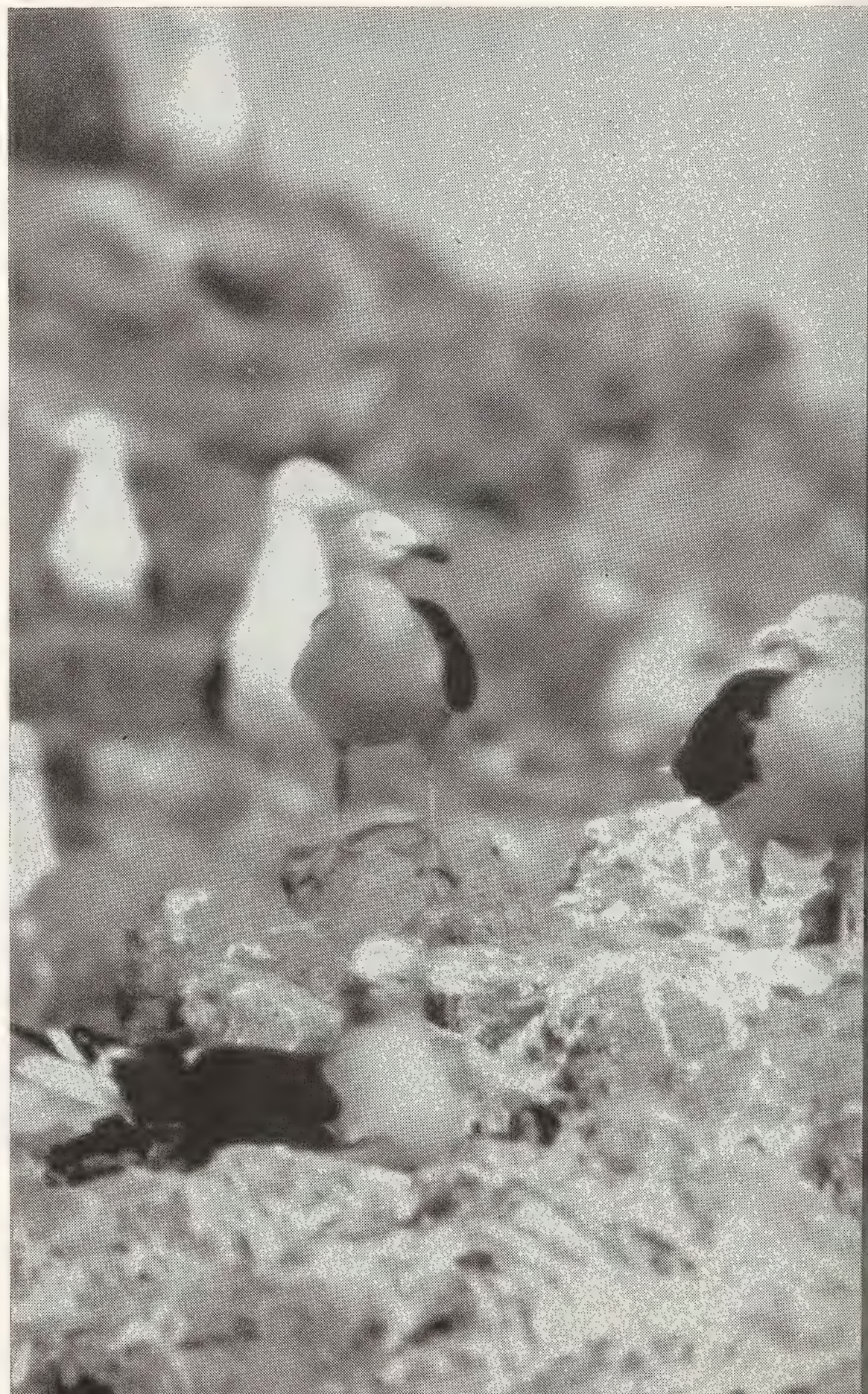
A dark olive Skua egg lay on the sand exposed. A chick rested under a piece of driftwood nearby as the adults flew overhead.

The nests of the gulls — Dolphins in the front and Black-backed in the background — were made on rock outcroppings.

ran quietly off. Another lighted nearby and, raising its wings high over its back, emitted the screeching Skua scream. Suddenly, I felt something coming at me from the side and ducked just in time as a Skua, looking several times life size, stooped with frightening speed at my head. I had only half-straightened when another came at my face. Up ahead Bill had made a wild grab and almost caught one of the big birds as it grazed his hat. I was perfectly prepared to admire the world's only bi-polar breeding bird, but under more friendly circumstances.

By holding the camera tripod over my head I was able to ignore the birds' threatening rushes and turn to finding their nests and chicks. Where I had earlier seen the Skua sitting, a dark olive egg stood exposed in a simple scrape. Nearby, under a bone-white piece of driftwood, I found a tiny yellowish-olive chick, not spotted like a gull chick. The setting called for a picture and I moved the egg to join the chick, with the parents zooming over my head. Then, worried less the blustery weather affect egg or chick, I replaced the egg and beat a hasty retreat to watch the aggressive parents return to their nest.

The nests of the gulls were very different from the simple scrape of the Skua. They were located on dark rock outcroppings, and each nest was a well-built cup of grass and sea weed, sometimes four or five inches high. Evidently the gulls nested later than the penguins, for most of the nests were occupied by birds incubating eggs. Here and there a large chick crouched, frozen in hiding amid the rocks, and rarely freshly-hatched chicks huddled in their nests as the old birds flew screaming above our heads. There were thousands of Black-backed gulls but we made no attempt to assess their total numbers



For sheer beauty, the most impressive birds were the Blue-eyed Shags. They were also the most numerous, their safety dependent on dense numbers. These birds are black-backed and white-breasted.

and our attention was soon captured by two other species nesting among the Black-backs — Black Oystercatchers and Dolphin Gulls.

The solid Black Oystercatchers (*Haematopus ater*) with their bright red legs and beaks seemed wholly out of place in the gull colony. Moreover, they appeared far too small and shy to survive among the big gulls. I photographed pairs whose nests were completely surrounded by Black-backs almost touching those of the big gulls which loomed over them. Bill Drury pointed out that this association was probably a fairly safe one for the oystercatchers because gulls usually refrain from seeking food in the area surrounding their nests and protect it from other predators as well. I noticed that the Oystercatchers sat more tightly on their nests than the gulls in the face of our advance.

It was while we were advancing, and gulls were rising in front of us and settling back down on their nests behind us, that we became aware of the surreptitious activities of the second species nesting with the Black-backs — Dolphin Gulls (*Leucophaeus scoresbii*).

The Dolphin Gulls were little gray birds about the size of a Laughing Gull, with bright red beaks and feet. They had a stealthy manner and taking ways. If a Black-backed Gull left its nest for a moment too long, the "Dolphins" would rush in, grasping the eggs, dropping and breaking them and squabbling over the spoils. When away from their own nests they were frequently harried and driven by the Black-backs and it was hard to see how they could maintain their nesting aggregations among the colony of bigger birds. The Dolphin Gull has been little studied but its manner and calls seemed so distinct that its investigation is bound to be rewarding. Bill obtained fine movies of its egg-snatching activities and I was able to make portraits of a nesting group, for these birds were not so easily frightened as the Black-backs.

By the time we could see the great, closely

Blue-eyed Shags are in the background and also in the foreground to the right of the Rock Shags. Black-backed Gulls glide in the air.

packed cormorant colonies, brief spots of sunlight were passing over the peninsula and picture taking became easier. Bob and Bill had preceded me and they now turned to make their way back while I set up my tripod to make pictures on the border between the gull and cormorant colonies.

The border between gulls and cormorants was sharply defined in comparison to the penguin-gull border and the reason for this was easy to postulate. The cormorants are weak in comparison to the penguins and they nest in the open. Probably their safety is more dependent upon dense numbers. And, in fact, the cormorants nest so close to one another that no other species could possibly wedge in. Unlike the penguins, cormorants were not nesting in isolated groups of twos and threes amid the scattered part of the gull colony, and their eggs would not have survived long if they had. The two species of cormorant or shag at Tombo were also unlike the penguins in an esthetic way; they had touches of brilliant color.

Most beautiful and most numerous was the Blue-eyed Shag (*Phalacrocorax atriceps*). It is black-backed and white-breasted with a crest, bright blue facial skin and yellow caruncles atop its cere. The other cormorant, the Rock Shag (*P. magellanicus*), was a smaller bird and nested in small groups among the Blue-eyed Shags. It was noteworthy for its brilliant red facial skin and slender beak. These two cormorants, especially the Blue-eyed Shag, are the basis of the Argentine guano-fertilizer industry. However, rich guano deposits on the bird islands off the Peruvian coast are mostly the work of another cormorant, the Guanay (*P. bougainvillii*). A Trelew friend, Sr. Meyer, had informed us that guano, which includes the seaweed nests as well as the birds' droppings, accumulated at the rate of 8 to 10 cm. each year in good colonies and that it has proved economically sound to work the best colonies once every five years. Economic values aside, both Tombo cormorants were beautifully photogenic and, as if on cue, the sun came out between the clouds as I broke out my camera and approached them to make color pictures. They sat tightly on their nests and indulged in sinuous displays, male and female simultaneously swaying their long, snake-like necks and preening each other. Behind one dense group of Blue-eyed Shags a great flat rock formation made a haul-out for Patagonian Sea Lions. In the waves behind the sea lions, splashes identified a flock of porpoising penguins. Black-backs drifted lazily overhead and Dolphin Gulls waited quietly for some avian indiscretion around the edges of the shag colony below. My shutter clicked again and again in the warm light of the late afternoon, and when I had finished the last frame of film, the sun went in. The birds had become used to me and it was with a special reluctance that I packed my gear, for Punta Tombo is the finest meeting of rocks and sea and wild creatures that I have ever seen.

They Learned About Animals by Work and Research

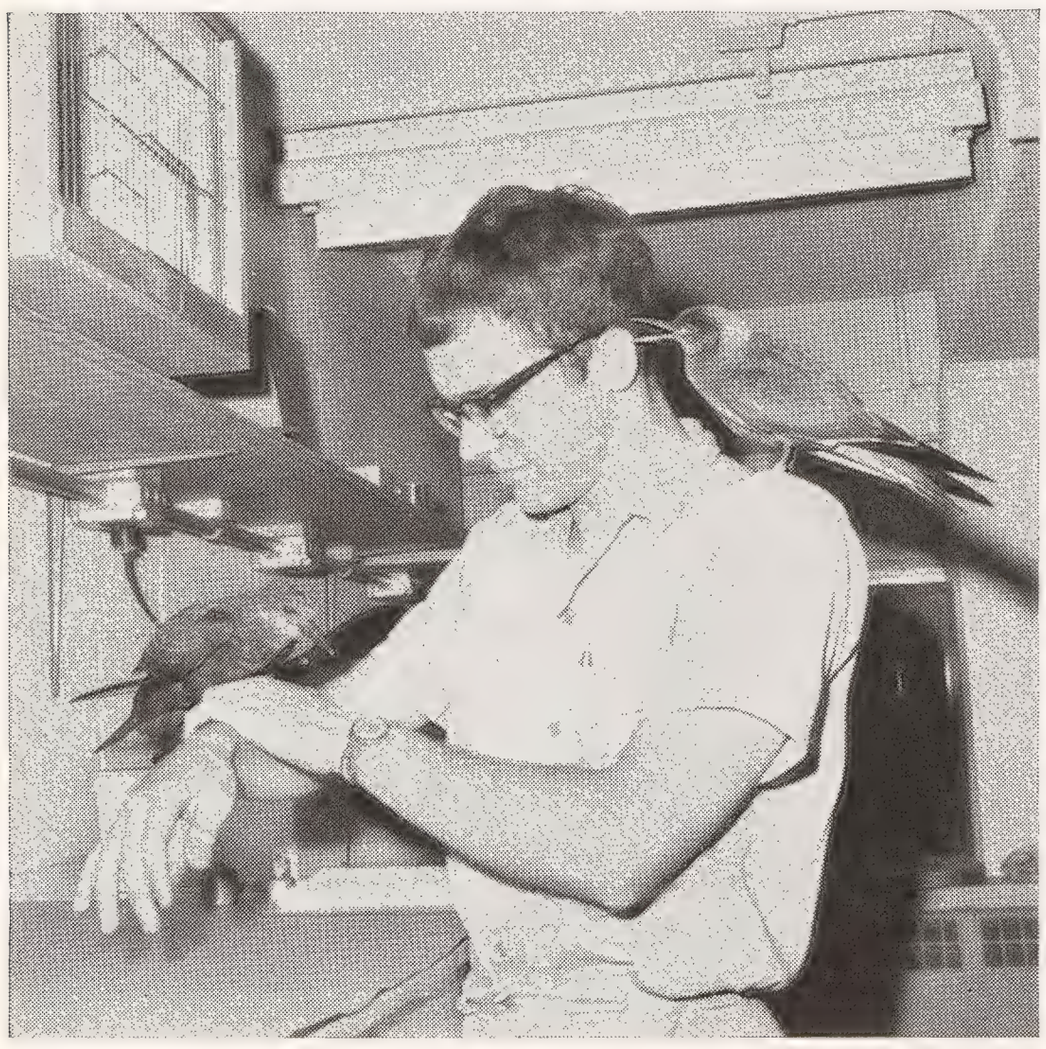
Frazier (on left) and Schuchman worked on temperature regulation in several large iguanas.

By WILLIAM BRIDGES

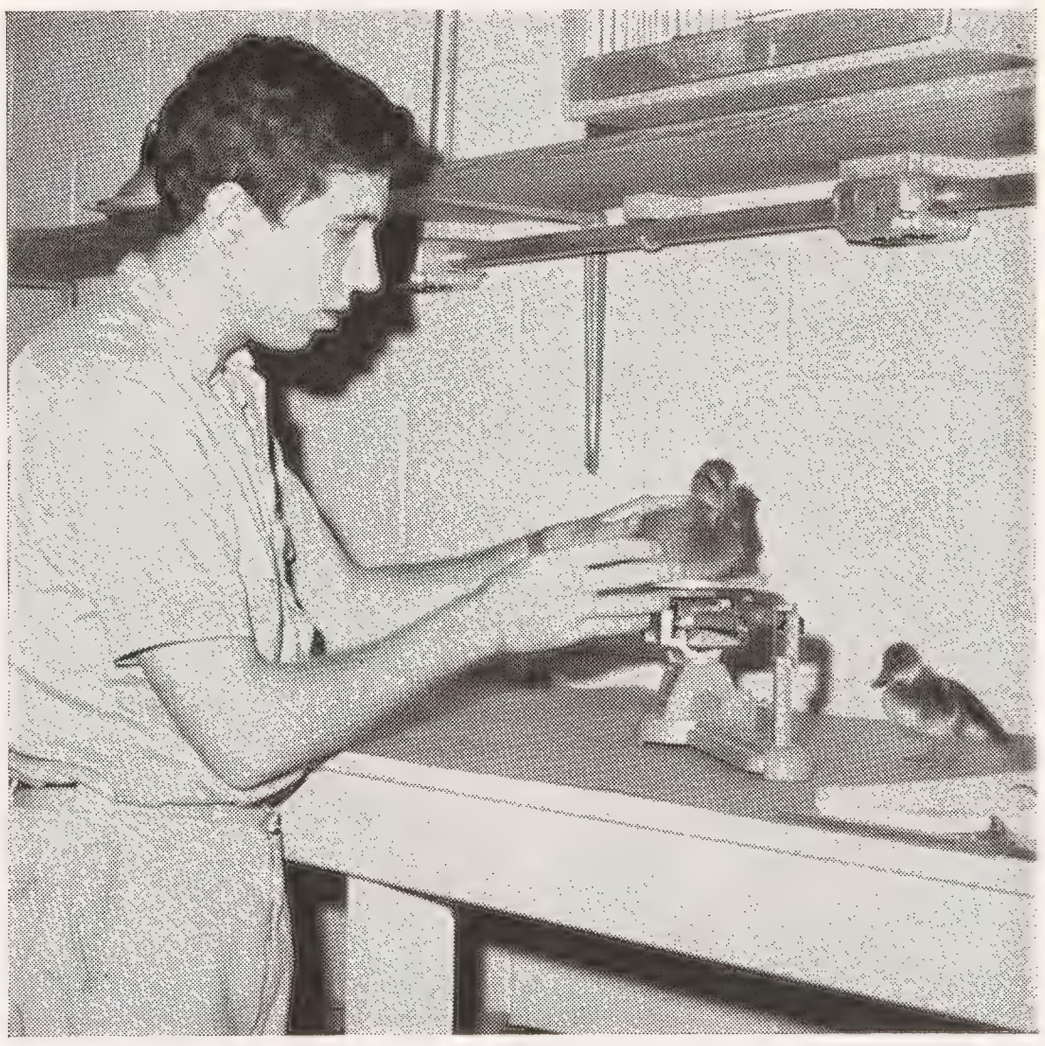
Curator of Publications

JUST BEFORE LABOR DAY the Zoological Park terminated its first, and extremely successful, experiment with a summer work-research program in which six Cornell students alternated between keeper duties in the animal collections and research under the direction of the Curators of Mammals, Birds and Reptiles.

The project originated with an inquiry last January from Prof. Gustav A. Swanson, head of the Department of Conservation in the New York State College of Agriculture at Cornell. It is a college requirement that undergraduate students specializing in wildlife management, fishery biology, vertebrate zoology, marine ecology or conservation education obtain at least two sum-



Nickerson had a hard time keeping his subjects — young Inca Terns — from becoming pets.



Mueller weighed and recorded the development of goslings and ducklings hatched here.

Greenstone probably enjoyed his summer most — he got to play with the baby Gorillas.

Jensen spent long hours watching the Père David Deer, noting shifting of relationships.

mers of practical experience, and Prof. Swanson felt that summer work in the Zoological Park would fill the requirements.

We liked the idea, but suggested that the program be broadened to include research, so that the students would gain more than experience in animal care and feeding. Each student would perform keeper work for 20 hours a week and devote an equal amount of time to specific research topics under the guidance of our staff.

With the approval of the Zoological Society's Executive Committee an honorarium was paid each student for his twelve weeks of work.

Our modification of the plan was received enthusiastically by the College of Agriculture authorities and it was agreed that the students would receive university credit for their research under a Department of Conservation course entitled "400-407 Research Problems." We have informed the Department that our ultimate goal is the establishment of a formal zoologist internship on a level that will entitle its participants to scholastic credit.

The six students, chosen by the Department of Conservation, began work at the Zoological Park on June 14. Several possible research projects were suggested to each one and a choice was made with the agreement of the Curator.

Paul R. Jensen chose to work on social interactions in our herd of Père David Deer. Full reports on their work will be made by all the students later this fall, but Mr. Jensen's findings revealed that under certain conditions, the old females in the herd assumed leadership.

The social interactions among our four young Lowland Gorillas were observed by Matthew H. Greenstone and a definite shifting of the pair relationships was noted.

Carl E. Mueller and Richard A. Nickerson were assigned to the Bird Department, Mueller working on egg and chick weight development among waterfowl in the Aquatic Birds Building, and correlation of laying times with weather. Nickerson studied the display of the Southern Long-tailed Manakin and the breeding behavior of Inca Terns and the Sun Bittern.

In the Reptile Department, John G. Frazier, Jr., made observations on the social behavior of the Giant Tortoises and Stephen M. Schuchman worked on temperature regulation of large lizards with particular reference to wind direction.

From the Zoological Park's point of view the first work-research program was an unqualified success; the students were serious, well-informed about research methods, and extremely interested in their projects. Several of them have been given a definite bias toward careers in the zoological sciences or veterinary medicine and intend to pursue new lines of study as they continue their work at the College of Agriculture.

ZOO NEWS IN PICTURES

Photographs by SAM DUNTON

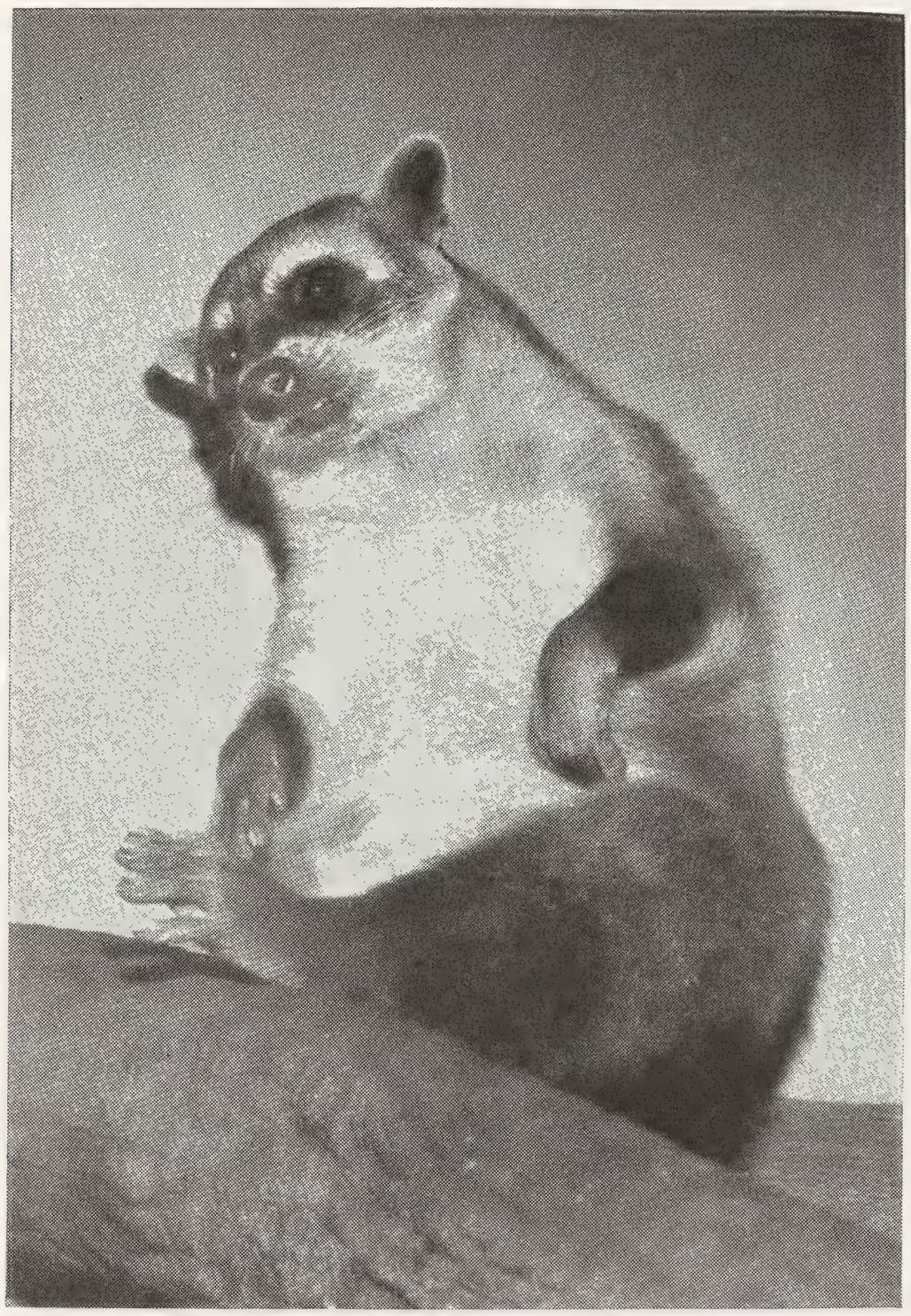
Staff Photographer

Who says animals are not polite? Three Springhaas (on the left) occupy a large compartment in the Small Mammal House, sharing it with several Flying Squirrels. When the daily pan of food pellets is put in the compartment, these well-behaved animals line up, each on his own side, and eat sedately.

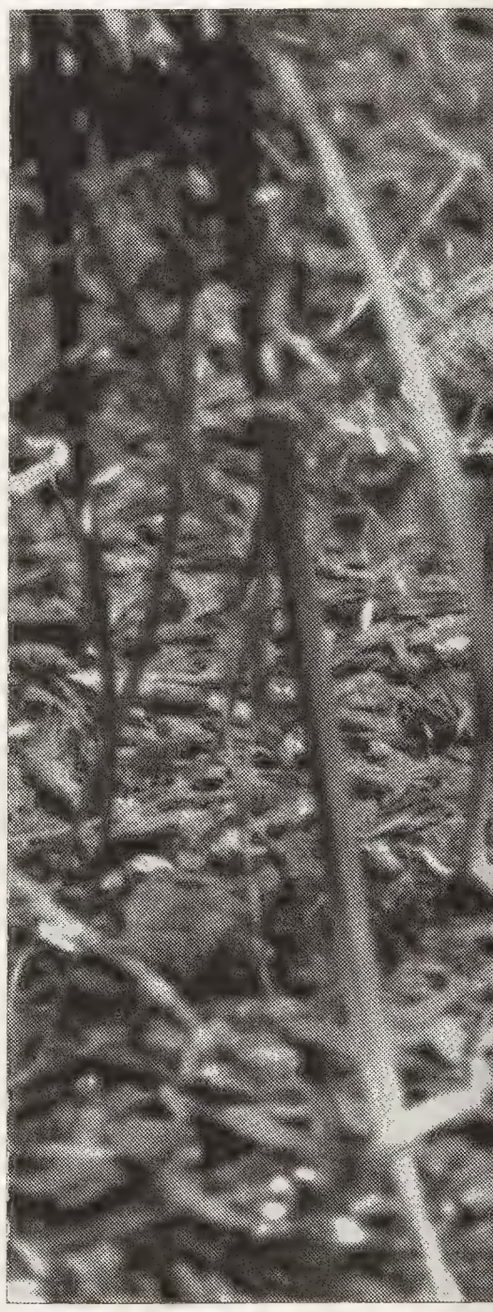
April 15

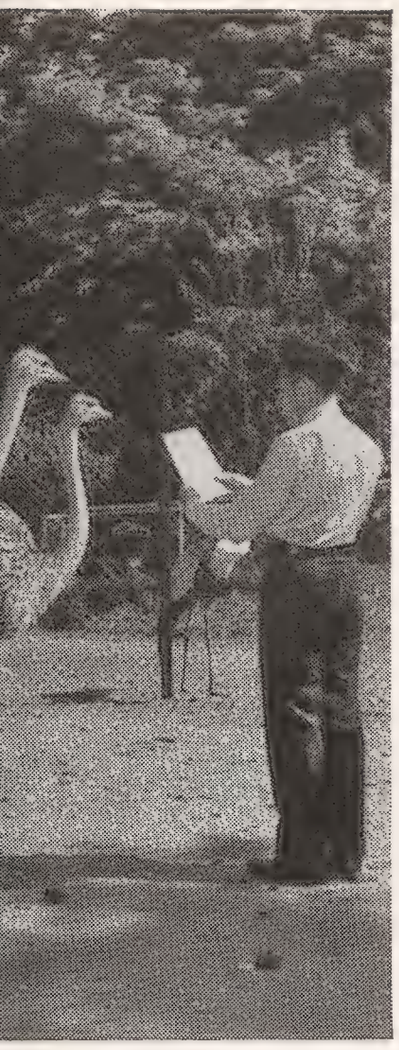
May 26

Adult Black-necked Stilts are boldly marke
and not particularly well camouflaged, bu
three chicks hatched in the Marsh Scene in th
Aquatic Bird House lately were hard to see



The Crab-eating Raccoon, whose several races range from Costa Rica to northern Argentina, is not quite as lazy as this pose would indicate; it is usually active in the Small Mammal House.





Ostriches are notorious for rapid growth, but we have seldom seen it exemplified as well as this summer when these photographs were made at intervals of a few weeks. In the beginning Keeper Clarke towered over them; at the end, they easily out-topped him.

September 2

This picture hardly needs an explanation; our Moustache Monkey itches at a definite spot on her back, and she points it out to her keeper, who is expected to oblige by scratching her.

OCTOBER 1965

In the Chicago Zoological Park—

HOUSEKEEPING FOR MARINE IGUANAS

By RAY PAWLEY

General Curator, Chicago Zoological Park

It was during a cold spell on May 28, 1964, that six young Marine Iguanas arrived at the Chicago Zoological Park from the Galapagos Islands by way of a reptile dealer in Florida. They were, to say the least, a challenge. Not only were they the first *Amblyrhynchus cristatus* we had seen, but we knew that most attempts to keep them in captivity elsewhere had met with very little success. Just to make matters more interesting, I had been on the zoo staff only one week, was still getting accustomed to the Reptile Building and the procedure of the park, and the reptile keepers had been in the building less than a year themselves. We, and the iguanas, were all on an equal footing!

This account is being written in July, 1965, fourteen months later. We still have four of the reptiles and in view of the interest in these "difficult" creatures I think it worth while to set down our experiences in some detail. Their maintenance, I may say, has definitely been a joint effort. Director Ron Blakely obtained them on behalf of the Zoological Society; Dr. Weaver M. Williamson kept a careful check on their health; Dr. George P. Rabb dug up all the published information available.

Few zoo specimens get such a thorough going-over as these Marine Iguanas received when they arrived, but all we could find were an infestation of tiny red mites clustered in the folds of skin on the fore-part of the body and a clear fluid oozing from the nostrils and between the lips. The mites were eliminated by scrubbing with a stiff-bristled brush (which the iguanas did not like at all); the discharge we decided not to treat, thinking it might be a normal physiological reaction to the lack of sea water. They showed no injuries and their over-all condition seemed to be satisfactory.

Taking stock of our situation, two points emerged: first, previous experience elsewhere was not going to help us much, because so little had been done; second, they would have to be fitted into the normal routine of zoo-keeping, for we lacked the manpower to "baby" them.

Their home was to be a cage 7 by 8 feet in floor space with a half-inch screen mesh top 7 feet above the floor. A single glass pane forms the front of the cage and a small service door overhead allows for servicing from above and access to lights dropping about two feet down from the top. These lights are focused so that the beams spread across the rock area along the north wall.

Because the central bank of cages is roofed with skylights, artificial light is supplemented weakly with filtered daylight. Artificial light is provided for eight hours during the day from two incandescent "sun lamps" that give off some ultraviolet rays, and two incandescent "white" infrared heat lamps. To eliminate any confusion on the part of the lizards as to the source of light and heat, all light sources are from one direction only. There is no subsurface heating.

A pool of fresh water in the forward half of the cage is about five feet wide, three feet across, and two feet deep. It is cleaned and refilled daily, since there is no overflow system. Apart from the rock area along the side wall, there is a circular construction of rockwork about one foot high to hold living plants. The floors are smooth concrete (slightly terraced) and the walls are painted with

When Marine Iguanas arrived at the Chicago Zoological Park in 1964, they were the first exhibited there. The staff was inexperienced — but fourteen months later four of the six were doing very well.

a water-proof semi-gloss surface over stippled concrete.

To keep humidity high, retard airflow and evaporation, and permit rather close adjustment of conditions in the cage, the overhead screening is covered almost entirely with plastic film, which can be moved as desired. Each morning, after the pool is cleaned and refilled, the entire cage is misted heavily to raise the humidity for several hours.

We were not totally without guidance in the beginning, of course; two articles in the New York Zoological Society's *Animal Kingdom** were particularly helpful. Dr. Dowling gave some habitat details and activity graphs based on 24-hour and 365-day seasonal periods, and much of our procedure was influenced by these and other of his data.

Dr. Dowling was quite definite about the grazing habits of the lizards and their preference

* Dowling, Herndon G. "The Marine Iguanas," *Animal Kingdom,* Vol. LXV, No. 6, 1962.
Eibl-Eibesfeldt, Irenaus. "The Art of Keeping Marine Iguanas," *Animal Kingdom,* Vol. LXVII, No. 3, 1964.

for seaweed. Dr. Eibl-Eibesfeldt offered a rather sophisticated diet, not easily matched by our commissary. We decided to compromise.

A small amount of reconstituted kelp seaweed was offered in a shallow tray of peagravel. In another tray we supplied a mixture of chopped escarole, banana, grated carrot and a small amount of ground horsemeat and cod-liver oil, all sprayed generously with sea water made from commercially prepared salts. Despite this variety, for the first few days they showed little interest in food or objects in the cage, even in the sea water they encountered during their constant wandering. They simply prowled aimlessly through the fresh water pool and over objects and each other. Each morning a small amount of feces was found and checked; whatever food was eaten, it was well digested.

One lizard had been very thin when it arrived, and it died two weeks after arrival. Autopsy disclosed that it had ingested some bits of kelp and banana, but digestion was not as thorough as we had assumed. We then replaced one of the original two sun lamps with an infrared heat lamp to increase the temperature of the rocks, and noticed that the lizards prowled less and rested more – but went right on becoming thinner.

A new program, based on Dr. Dowling's 24-hour activity cycle reported from the Galapagos, was thereupon put into effect:

1. First thing in the morning, before turning the lights on, change the water in the pool and refill with fresh water at 70-74° F. Cage, rocks and lizards sprayed thoroughly with a fine mist.
2. Lights are turned on immediately afterward (sunrise), whereupon the lizards began to prowl.
3. Before the cage warms up appreciably, food is offered and thoroughly soaked with the salt water. According to Dr. Dowling's articles, these lizards feed during the relatively cool morning and bask during the heat of the day. In the wild, early morning is probably the lizards' main contact with salt water.
4. Food is removed at noon.
5. Lights go out at 4:45 o'clock in winter, 5:45 in summer, and 6:45 on summer week-ends.

Despite all this, there was still reluctance to feed. In mid-June we decided against forcefeeding, partly because of the disturbance of handling and also defecation showed they were eating at least something. One of the keepers suggested that we put a young Green Iguana (*Iguana iguana*) in the cage, to teach them how to eat, and with some misgivings we did. The Marine Iguanas watched the intruder closely at first, but after four hours resumed their indiscriminate wandering and lying on top of each other.

On following mornings the Green Iguana immediately dashed for the food without getting a rise from its "students," but on the third day three of them immediately joined in at the feeding pan.

No belligerence could be detected, but as time went on the Green Iguana fed less and the Marine Iguanas showed increasingly ravenous appetites. After the meal on June 23 the Green Iguana was returned to its own exhibit, and it eagerly resumed its normal feeding.

Thereafter the Marine Iguanas quickly settled down and there was little restless wandering. At this point we tried introducing Hermit Crabs, which got no response at all from the Iguanas; they are still in the exhibit, and treated with indifference.

By the time we had worked out a basic diet (to be outlined later), we attempted to discover whether flavors made a difference. The diet was divided into three portions; one was left unflavored, the second was heavily flavored with cod-liver oil, and the third was mixed with honey.

The Marine Iguanas' home is seven feet wide, eight feet long and seven feet high. Artificial light is supplemented with filtered daylight. The pool of fresh water is five feet wide and two feet deep.

Photograph by Alan Levine

The iguanas sampled them all indiscriminately!

We had noticed that they tended to gorge themselves until their stomachs were very distended, so Fridays and Mondays were decreed as fast days – a practice we still follow.

They were making progress, we felt, but on August 28 a second lizard died. No cause of death could be determined.

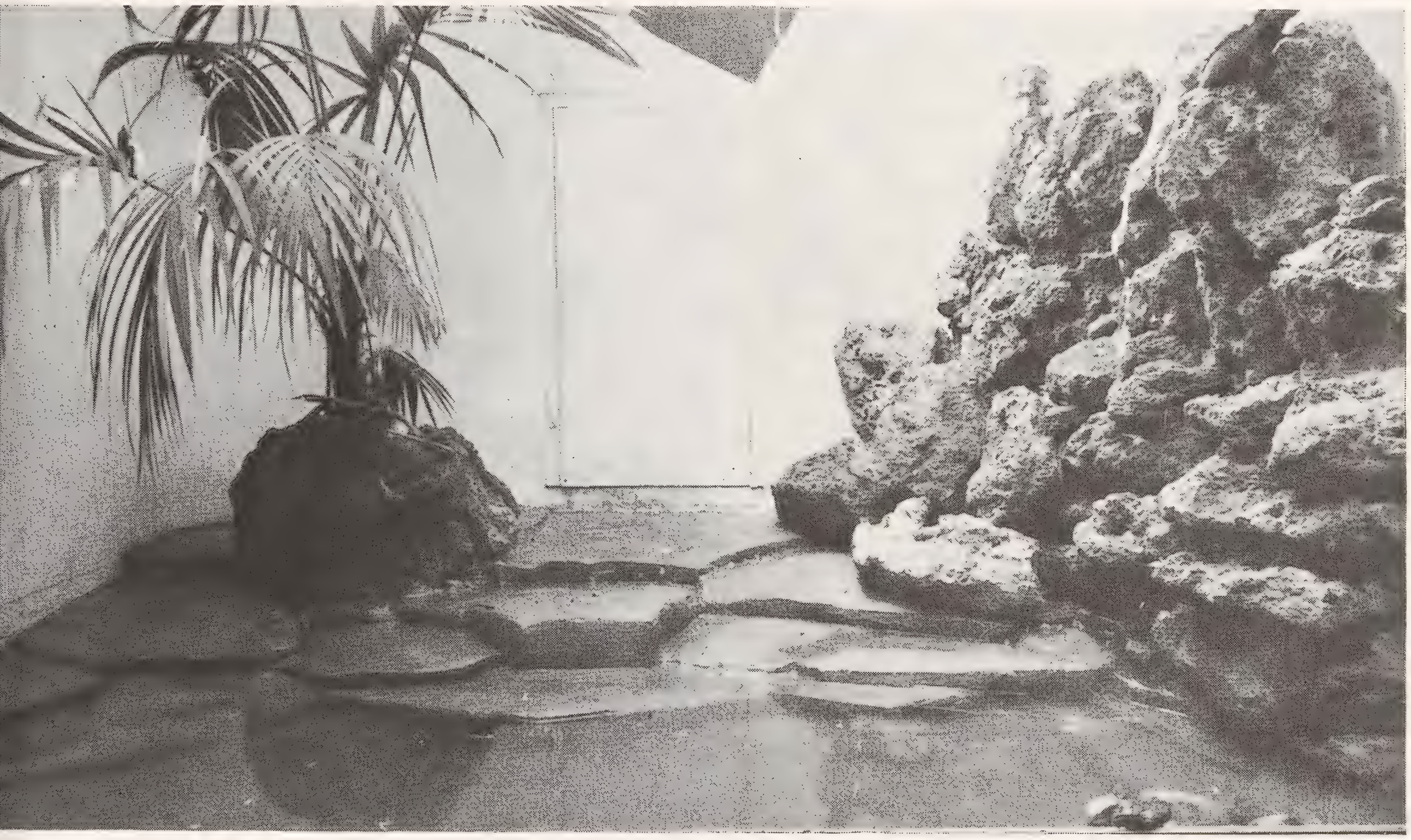
Our assumption that this was merely a case of lack of adjustment was short-lived, for next we noticed that the smallest of the remaining four was becoming thin, refusing to eat as heartily as before, and becoming restless.

Why? We could see no outward sign of con-

flict, no tendency for one to dominate a sunning-spot to the exclusion of another; sometimes one lizard would sun itself on top of another. Was there an indiscernible peck-order whereby the smallest specimen would become dominated by the others, until one after another the group dwindled away?

Our first clue came when a keeper opened the overhead service door suddenly, startling the colony so that the four hid among the rocks. The first lizard to emerge was the skinny specimen. It selected a sunning spot apparently at random and assumed a sunning position. The next lizard out was No. 3 in the peck-order and instead of choosing a different site, it went directly to the smaller specimen, climbed on top of it, and also took up a sunning position. After a minute or two the smallest iguana crawled out from under and went to a new spot. As each succeeding lizard emerged, it took a position on top of a smaller specimen, which would cause that one to move to a still smaller cage-mate, right down the line. The disturbed lizard usually found a vacant area or a smaller specimen on which to bask, and rarely approached a larger companion with the intention of basking. Continued observation showed that this pattern was fairly regular.

Obviously, the thing to do was to rearrange the rock pile to provide four equally-desirable basking sites. This meant they were in new quarters off exhibition for a week. On their return we were surprised to find they had to be readjusted to their cage practically all over again. The pattern of aimless, continual wandering resumed and the thinnest specimen became alarmingly thin. Then, on the tenth day, they began feeding voraciously as though there had never been an interruption!



And they did respond to the new arrangement of the rock, without the previous "bumping" down the peck-order line. Since then there have been no problems threatening the group as a whole.

Now for a miscellany of observations and notes.

Growth. In one year, two specimens have gained about 20% in size over the other two. The former have retained a heavily swollen appearance in the throat area, and a slight oozing of saliva-like fluid from the mouth.

Behavior and Color Changes. Colors seemed to brighten during the winter months, in the red and green patches on the back, but only slightly. Superficial head-butting was infrequently noticed.

Temperament. Reached for or pursued, they dash for a hiding place. Cornered, they lash out with the short tail and when grasped they scratch to get free. They may even bite; the teeth are short but the jaws are surprisingly strong. They prefer to release their bite only when they themselves have been released. After a year, we feel they have adjusted only moderately to "close" association with human beings.

Hardiness. They may lie for many moments within a foot of the lamps without moving away. Eight hours of ultraviolet sun lamps troubles them not at all. If the fresh water pool is in their way, they enter it without hesitation although it may subject their bodies to a drop of 20° F. or more.

They do not seem to require more commercially prepared ocean salt water than what is given on their food and the rocks. There is no receptacle for salt water large enough for them to immerse even the head. The only appreciable amount they get is what is ingested with their food or sprinkled on their backs each morning. Stray bits of putrid food are sometimes eaten long after the feed pan has been removed, with no ill effects.

Lack of air circulation is not critical. Humidity has reached 90% and dropped to 30% for more than 24 hours; no problem.

Temperature does seem to be important, with a source of high heat available during a part of the day.

Diet. The closest we could come to seaweed was dried kelp from the oriental foods department of a supermarket; it is reconstituted in fresh water. We shred it and add it to the diet. Escarole or kale are used extensively for bulk as well as nutrition.

The diet we use now (July, 1965) is:

1 tsp.	Brewer's yeast
¼ tsp.	Peanut oil
⅛ tsp.	Dicalcium phosphate
¼ tsp.	Trace mineral powder
1 tsp.	Honey
½ tsp.	Cod-liver oil
1 tsp.	Molasses
1	Banana, mashed
1 tblsp.	Ground horsemeat
1 tblsp.	Bone paste
¼ cup	Grated carrot
¼ cup	Reconstituted seaweed (kelp)
3 cups	Escarole, shredded or chopped

This mixture is stored under refrigeration for not more than 18 hours before use.

Because the lizards utilize pebbles, the food is placed on a shallow tray filled with peagravel. The artificial salt water is sprinkled over the food and the adjacent rocks. Algae has developed on the rocks where this water is sprinkled, and on rare occasions iguanas have been seen nibbling at the algal spot with the characteristic sideways grazing motion.

Live crickets, earthworms, and cockroaches have been offered and were refused. We have not offered fish.

Sansevieria and croton were planted in the cage and the lizards chewed the sansevieria leaves thoroughly and ate many croton leaves.

As the lizards strolled, they often walked through their food and their bellies were coated with oils from the diet, so that a deposit was built up that all but prevented skin shedding. One of our men came up with the idea of putting a small, shallow, tray of peagravel on top of the feeding tray and tucking the food around the edges of the larger tray, where it can be bitten off but not waded through. This works very well.

After nine months we received from George A. Bartholomew a report on temperatures at Marine Iguana basking sites in the Galapagos:

Lava rock by day: 112° F.
Same rock at night: 78° F.
Water temperature by day: 72-80° F.
Air temperature: does not rise above 86° F.

By comparison, our cage conditions are:

Rocks under the lights: can reach 95-105° F.
Same rocks at night: can drop to 75° F.
Freshwater temperature: about 78° F.
Air temperature: 85-95° F.

Ailments. Strongyloides parasites are present, but in low concentration, and we are not treating them at present. The thin specimen had a mouth condition reminiscent of canker sores in snakes; it cleared up after one treatment with Tri-biotic (Wyeth).

Behavior. After a few days they paid no attention to the window-tapping visitors. Keepers are required to go about their cleaning, feeding and other duties in the cage in a normal manner, and the lizards have adjusted to this.

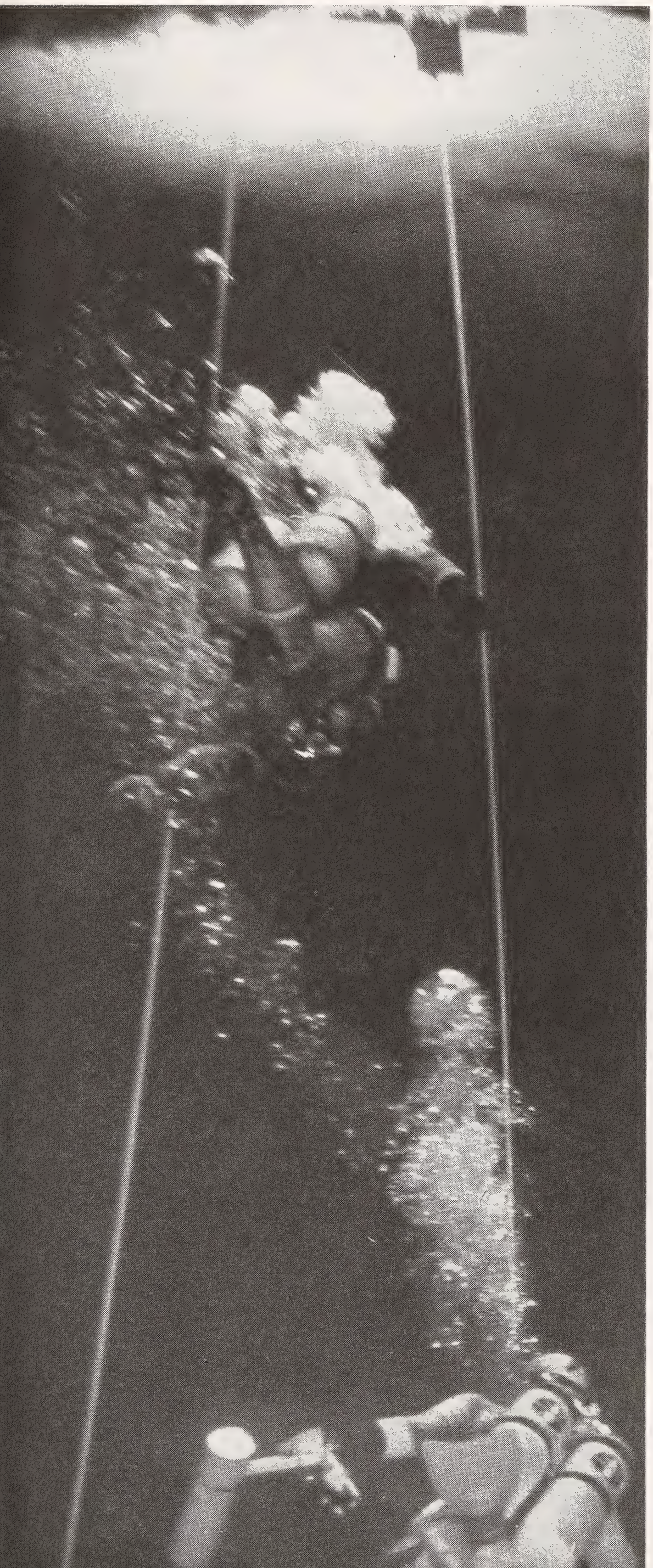
In conclusion, I can report that in the past two months (June and July) we diminished dietary additives to once a week. They still gorge themselves, but their growth rate may have a chance to catch up with their obesity. If we notice any food preference, it is for the kelp – but slight. We notice a few signs of head-butting and lizards-interested-in-lizards activity. It is going to be interesting to see what happens next!

THE WEDDELL SEAL AT HOME (Part 2)

By WILLIAM E. SCHEVILL

Woods Hole Oceanographic Institution

Photographs by David O. Lavallee & Carleton Ray



FIVE OF US, from the New York Zoological Society and the Woods Hole Oceanographic Institution, had come to McMurdo Sound in the Antarctic to study Weddell Seals under natural conditions.* We had set up our camp on the 6-foot sea ice, with three ice-holes giving us access to the thousand feet of clear, cold water beneath. The sub-ice observation chamber (SOC) was in one, and through another hung our three hydrophones, while the third was kept open for the use of divers and seals.

The divers went under the ice almost daily, watching and photographing seals as opportunity offered. The acoustical team listened continually during waking hours and recorded most of the time (in all, we accumulated about 400,000 feet of magnetic tape, which will take us some time to study and analyze). For several hours each day an observer occupied the SOC, whence he could watch the other two holes and the upper hydrophone, and see seals more than 200 feet away.

In striking contrast to the usual brilliant sunshine above, the view under the ice from the SOC was like a somber overcast day. The ice ceiling with its irregular soft under surface looked like a tight cloud cover, especially early in the spring, before the algal growth began to stain it brown. Under it through the incredibly clear water, the distance was a dull dark metallic blue, shading downward into a darkness which became quite black. Near objects were given a pale greenish tinge by the ice-filtered sunlight. The cloudy ice overhead showed darker patches where

---

* See *Animal Kingdom,* March-April, 1965.

Two divers descend into the Antarctic waters of McMurdo Sound in search of Weddell Seals. Above them, holes in the six-foot-thick ice shine like beacons in the black of night.

the thin snow cover was a little thicker and where huts or vehicles stood (small shadows, like those cast by men, were not readily detected). But shining like the lighted windows that they were, holes in the ice were really conspicuous. There is little mystery in how the seals find air holes from the upper two or three hundred feet during the bright spring daylight. In mid-November, when the observer in the SOC could follow the divers' bubbles out under the ice to a measured 240 feet, the divers could still see the SOC, brightly lighted through its thinly iced-over hole, at an estimated 275 feet. A little later in the season the burgeoning plankton bloom clouded the water more and more, but did not reduce visibility much below 200 feet until after we left. Thereafter conditions deteriorated with increasing rapidity, until by mid-December one could not see more than 30 or 40 feet.

Our task was to learn as much as we could about the way of life of Weddell Seals and the role played by acoustics in communication, navigation and hunting. We realized that we would at most learn only part of the story, since sight could assist or take over these tasks in the bright light of springtime, when conditions in the upper waters would be very different from both the darkness of winter and the murkiness of summer. Even at the depths to which these seals habitually dive it might not be utterly dark in spring. The purpose of spacing our hydrophones as we did was to determine the approximate depth at which the seals were calling so that we could see if any differences in the calls were related to depth. From the chamber we could watch the seals that were being heard on the nearby shallow hydrophone and sometimes connect visible actions with the sounds heard. Of course, since sound is transmitted far better than light in water, we heard many seals that were much too distant to be seen (up to a few miles away), but the loudness of the sounds as heard gave a hint of proximity, and when they could be matched to actions as we watched, we could often be quite sure of our observations. Besides, the man in the SOC, when the hydrophone channel was cut off, could hear only the loudest nearby sounds through the chamber walls, so that we could assume that he was watching and listening to the same animal. Like others before us, we could hear nearby seals through the ice and also through the floor of the hut.

We also wanted to be able to recognize individual seals underwater, which we found not always easy with animals capable of such protean changes of shape. One or two had conspicuous individual markings, but most did not, so we proposed to remedy this situation by supplying the marks ourselves. With a spray can of orange paint we decorated several seals. Some we marked while they were on the ice some distance from a hole; these marks, which had time to dry before the seal went in again, lasted as long as a week. We marked others in a more sporting manner by ambushing them as they surfaced to breathe, but gave this up because it frightened the seals, and because the paint did not last, having had no chance to dry. The marks which persisted enabled us to recognize individuals and showed us, for example, that certain seals were subordinate and yielded breathing holes to others.

We sometimes sat long in the SOC without having much to watch, but usually there was seal traffic to and from the air holes. From observations at the holes we have come to some tentative conclusions about the seal's use of the sounds, although we may have to modify them after detailed study of all our notes and tapes. All the sounds we heard as we watched seemed clearly to be of communicative or social use. We had no hint that any echolocation was going on; this was not surprising, for the seeing was so good that there seemed to be no point in using a more difficult technique. The "rr-whmp" sound was used in driving away a competitor. Perhaps the "chnk, chnk" of the victim expressed frustration. The characteristic descending trill seemed to be uttered as a seal approached the breathing hole, but we heard it so often that it must have other uses as well.

When there were no seals about, we could watch the sparse plankton drift past the windows in the weak current, usually with an easterly set of about a twentieth of a knot. We recognized two kinds of jelly-fish, one of which had long straw-colored tentacles; they were at least 15 feet long in one with an umbrella about two feet across. The divers reported bigger ones with tentacles 35 feet long.

Infrequent at first, and later increasingly nu-

merous, were yellow pteropods which drifted along beating their wings, apparently to maintain their depth, for they sank when they stopped flapping. Someone said they looked like angels in a sack race.

Fish were scarcer, and only a few solitary small ones were seen, less than a foot long. Unfortunately, our location was evidently not over good fishing ground, so that we never saw seals coming up with the big four-foot nototheniid fish that they sometimes bring to the surface to eat.

An obvious way to get hints of the significance of the seal calls is to try them on the seals, so we played back selections that we had recorded. We were not especially hopeful, for past attempts in other places thus to influence seals and porpoises had been unsuccessful. But this time it was different. Almost immediately we heard and recorded replies to our playback, which we did not turn on until a seal was sighted from the SOC. After the first response the puzzled seal took close looks at the underwater transmitter. Each new burst of seal talk would bring the listener back for more inspection of the un-seal-like little cylinder, and often for mimicking of our transmission. Successive visitors behaved in much the same way, though one of them, repeatedly recalled by bursts of recorded seal talk, finally came through the hole into the bottom of the house in search of the talker. Confronted by two curious acousticians, it withdrew after a decorous pause. A little later, after an interval, we played back without a seal in sight, and had one within two minutes. This one was quite aggressive, biting the transmitter and batting it with fore flippers. We were unable to relate the seal's attacks to particular calls; perhaps it was just the tone of voice, or perhaps we had recorded the voice of a social inferior (one low in the peck order). Next day we tried again, and found the seals most blasé. They showed hardly any interest; our broadcast no longer brought them in from afar, and did not lure passersby right to the transmitter. There were a few partial exceptions, but nothing like yesterday's excitement, and hardly any backtalk to our transmissions. However plausible our playback had at first seemed to the seals, now, a day later, it did not appear to sound convincing enough to make them investigate. Although we were excited by our first immediate success, it is still clear that we have much to learn. For one

The long silver-blue of the crack was visable for nearly a hundred yards in either direction. The color turned from silver to blue from near the surface to the underside of the ice ceiling.

Light from a hole in the ice strikes the head and back of a Weddell Seal as it swims upward toward the opening. Members of the expedition spent hours watching seal traffic.

thing, a knowledge of this seal's hearing range would help us improve the playback fidelity.

The SOC and environs was one sort of data-gathering-center. Another was a natural seal colony. And there the SCUBA diver took over. On a bright, calm November afternoon, we headed for our first dive at Sulphur Cones tidal crack, below Castle Rock. We entered the water through a natural seal hole one by one, adjusting suits, masks and gloves so that a minimum of leakage of freezing water would occur. We were almost totally unprepared for the magnificence of the scene which greeted us. The long silver-blue of the crack could be seen nearly a hundred yards in either direction. The crack broadened downward and the color turned from silver to blue from near the surface to the underside of the ice where the gentle brown of the diatom layer took over. At intervals of three to six feet on the underside were bluish crystal chandeliers, up to four feet long. In the crystals as well as on the bottom lived little nototheniid fishes (Antarctic "cod") and yellow amphipods (crustaceans related to "sand fleas").

The bottom sloped gently upwards from a depth of 70 feet to shore over 400 feet away. We could almost imagine seeing that distant shoreline. This bottom was covered with starfishes of two kinds, nemertine worms up to three feet long, soft clams, sea urchins and others. As we continued our dive, we encountered the Weddell Seals from the ice above from time to time. They submerged carefully, looking about underwater like a person entering a strange room. But this was no strange world to them. They swam unhurriedly, relaxed, at home in one of the harshest environments known to mammals. We were genuinely moved by the ease of their swimming, at their adaptation and at the knowledge that we were privileged to see them thus — unafraid.

The seals did not take much notice of us. In ensuing days we witnessed fights for holes (territorial?) and at least two instances of seals dozing under the ice, using positive buoyancy in their lungs to keep them up against the overhead. One wonders at the magnificent metabolism allowing mammalian sleep in such waters. These investigations, like the acoustical ones, are not yet complete, but just in seeing a thing at once so beautiful, strange and revealing, one learns a great deal.

As has so often happened, our trip to the Antarctic to answer our questions about the Weddell Seal has framed other questions. As we study the data we brought back, we hope for answers, and at least indications how to test the new questions.

We All Ritualize Our Behavior Sometimes

By JOCELYN CRANE

Director, Department of Tropical Research

Early in the summer, Miss Jocelyn Crane, Director of our Department of Tropical Research, attended a conference organized by Sir Julian Huxley for the Royal Society in London. On her return she made a report to the Trustees of the Zoological Society from which the following is an extract. – Ed.

THE CHEERFUL YOUNG ENGLISHMAN up on the platform put one foot forward and rocked vigorously back and forth. "This is conflict behavior!" he explained. "I find myself rocking during every talk: As the speaker, of course I want to dominate you thoroughly. But then, I also want to run away. . . . You'll probably see lots of similar activity up here in the next few days!"

We did, too, at that London conference on behavior. Along about Friday the President of the Royal Society remarked that he probably had to listen in a year to more scientific papers he didn't understand than anybody else in the room. But from now on he wasn't going to worry. He was just going to sit back and enjoy *watching* the speakers.

We all enjoyed that pastime, except when it was our turn to be up there being watched. Even one of the most poised and famous participants turned slightly pink when a speaker-watcher said of him, "I have had the pleasure of observing my friend here at conferences since 1950. In those days, in moments of disagreement, he stroked his chin – a harmless ritualization of his aggressive impulses. In recent years he has grown a beard . . . and now he strokes *that*."

Our subject was officially "The Ritualization of Behaviour in Animals and Man," and before we had done we examined any number of ritualizations in all senses of the word. These ranged from old Greek masks and the human prayer position to courtship in blackcock and the altered rain-dance of captive chimpanzees.

We made a mixed group of scientists. Formed of people who were professionally interested in some kind of behavior, we divided roughly into anthropologists, sociologists, psychiatrists, psychologists, and ethologists. We numbered about twenty-eight speakers and, with the addition of noncontributing guests, were a convenient size for give-and-take.

Ethologists are probably best defined as zoologists devoted to the biological study of animal behavior. A corollary is that they do not work happily on white rats in undersized cages. As one contributor remarked, "The activity of an animal on a treadmill is about as typical of normal behavior as that of a one-armed bandit in Las Vegas is typical of humans." I was invited to attend as an ethologist and to give a paper on fiddler crabs – wild ones.

The various kinds of scientists disagreed wholesomely on how "ritualization" should be used. Ethologists use the word particularly when speaking of a certain kind of evolution. Here a piece of behavior has been changed and made to stand out as a signal. A Mandarin drake, as part of his courtship, touches a certain wing feather with his bill. This feather, both enlarged and bright orange, thrusts like a flag from the surrounding green. The behavior and the changed feather represent "ritualized preening." Among a host of other displays, the Mandarin's signal is unique. In contrast, one loyal anthropologist regretted that "ritual" and its derivatives are no longer reserved for the business of priests and medicine men.

The ethologists learned a lot from the workers on human behavior, and we hope the latter also

learned from us. After all, man is the only animal, in all our redundantly aggressive animal kingdom, that fights to the point of freely killing members of his species. The uncommon fatalities in fighting animals prove, on study, to result from accident or from conditions of captivity. This generality seems to hold even in famous cases where females eat males. Such are praying mantids and spiders.

In contrast, harmless threat displays and ritualized battles are the rule from horned beetles to antlered stags. Every time we study one of these groups the fighters turn out to be fitted with both brakes and armor. The safeguards are not only physical but behavioral as well, and together act to prevent serious injury. The fights in fact are often as stylized as an exhibition match with foils.

In animals this kind of behavior is largely under genetic control. Human beings, of course, have to learn most of their innumerable ritualizations, whether aggressive or not. Many are bonds which keep groups together, even while they tend to encourage aggression toward outsiders. Assorted samples range from Elizabethan ruffs (ritualized white collars) to flags, accents and the golden mace of the Royal Society ("just a ritualized weapon").

Probably almost everyone agrees that aggression, no less than the urge to get together, is a built-in part of human nature. We used to think that the best way to deal with our fighting tendencies would be to learn how to encourage group-making without producing the aggression that almost always goes with it.

Study of all social organisms, both animal and human, has, however, long been showing that aggression is ineradicable. Not only that, but it is also vital for success. So a more realistic approach, based firmly on both ethology and human psychology, is to find out more about how to put aggression constructively to use. Equally, we must learn to spill the excess over – tidily and even artistically ritualized – into harmless channels. In the splendid variety of our human world, bullfights, baseball and the space race surely aren't the major answers. Perhaps inspiration will come from meetings such as the London conference.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Five Crocodile Birds in the Shore Scene

For some 2,500 years the Crocodile Bird has been celebrated for its reported habit of entering the gaping mouths of crocodiles in search of bits of food. We now have five of the birds on exhibition in the Shore Scene in the Aquatic Birds Building. We do not, however, expect to test the legend by installing crocodiles in the scene, and the birds seem perfectly content to feed on the less exotic fare provided for other birds of the shore.

The Greek historian Herodotus started the story about the Crocodile Bird (Egyptian Plover and Black-backed Courser are other popular names and its scientific name is *Pluvianus aegyptius aegyptius*) and the Roman naturalist Pliny continued it. Some present-day naturalists are willing to admit that the bird may occasionally pick leeches, bits of food, or flies out of a crocodile's mouth, but there are so few reports of the birds actually entering the reptiles' mouths that it is certainly not a general habit. They think that if it does sometimes go inside the jaws as the crocodile gapes, it is probably in search of flies. Several other birds habitually associate with basking crocodiles, walking on them and hunting flies on their bodies, and are not harmed. They are probably most useful in giving the alarm when an enemy approaches, for at the urgent cry of the Spur-winged Plover, which sounds like "quick-quick-quick," crocodiles normally take alarm and slide into the water.

In one volume of his history, Herodotus wrote:

"All other birds and beasts avoid him (the crocodile), but he is at peace with the Trochilus (an old name of the Crocodile Bird), because he receives benefit from that bird. For when the Crocodile gets out of the water on land, and then opens its jaws, which it does most commonly toward the west, the Trochilus enters its mouth and swallows the leeches; the Crocodile is so pleased with this service that it never hurts the Trochilus."

The home of the Crocodile Bird is northeast Africa.

First Harbor Porpoises Are Exhibited at Aquarium

Four Harbor Porpoises (*Phocaena phocaena*) from the Bay of Fundy went on exhibition at the Aquarium at Coney Island on September 9. They are the first to have been exhibited anywhere.

These true porpoises are the smallest cetaceans found in the oceans on either side of Canada and the United States, adults reaching a maximum length of 5 feet and a weight of about 110 pounds. Our new specimens are three young females and a young male, 47 to 51 inches in length and weighing 62 to 72 pounds.

Director Paul Montreuil last year informed the Atlantic Biological Station of the Fisheries Research Board of Canada that we were anxious to obtain porpoises, and the Station publicized our request among fishermen of the area. On September 5 Vernon Stuart caught the animals in his sardine weir in the Bay of Fundy and when word reached us, Aquarium tankmen and a truck were dispatched to get them.

The four "Puffing Pigs," as the Harbor Porpoises are called in the Bay of Fundy region, will eventually be exhibited in the Aquarium's big Oceanic Tank as companions for our Beluga, or White Whale.

John L. Miller Joins Staff

John L. Miller, an experienced newspaperman, has joined the staff of the Zoological Society as Associate Curator of Publications. A graduate of Ohio Wesleyan University, he has been a reporter for the Miami *Herald,* the Associated Press, and the New York *World-Telegram & Sun,* and most recently was engaged in radio and television work for the National Broadcasting Company.

This picture was made at the instant Director Conway picked up the first of the Tufted Puffins we have just received from British Columbia. On hand in Aquatic Bird House at the occasion were Grace Davall and H. J. Knobloch.

Straying Sealion Becomes Pet at the Aquarium

Sealions are not zoological rarities and the arrival of another specimen at the Aquarium at Coney Island seldom gets much public attention. One exception is "Happy," a young female sealion, turned over to the Aquarium on July 31 after she jumped aboard a dredge off Staten Island.

The little animal apparently had escaped from an exhibit at Ocean City, Maryland, and was so accustomed to people that she willingly boarded the dredge. Dredge hands, however, were not

accustomed to sealions and drove her into an iron pipe for safekeeping before they delivered her to the Aquarium. After a few days of plentiful food and attention, she recovered from her ordeal in the open ocean and has settled down happily in one of the pools at the Aquarium's new "Seal Island."

Correction

In the caption to a photograph on page 125 of the July-August issue of *Animal Kingdom,* the scientific name of the Sugar Glider was erroneously given as *Petaurista breviceps.* It should have been *Petaurus breviceps.*

In Swahili Now

"Our Plundered Planet," the book which Dr. Fairfield Osborn wrote in 1948 to call attention to the destruction of the earth's natural resources, is now being published in Swahili for distribution in Africa. This is the twelfth language into which it has been translated.

IN BRIEF

A Difficult Operation. Removal of the scent glands from a skunk is not ordinarily a hazardous operation, except for the surgeon if the glands happen to break, but Dr. Gandal ran into special problems with a skunk being operated this summer. Three times during the operation the animal's heart stopped beating but each time closed cardiac massage revived it and, under artificial respiration and oxygen, the surgery was completed. The skunk made an excellent recovery.

In our continuing effort to prevent vandalism, two trained German shepherd dogs patrol the Zoo every night on leash. Shown are Guards William Collister (left) and John Massaro.

Births in the Zoo. So many mammals, birds and reptiles are born (or hatched) in the Zoological Park that we are boasting about it to our visitors. A new panel at the entrance to the Administration Building lists births and hatchings for 1963, 1964, and for cumulative three-month periods in 1965. Species figures for 1963 are: Mammals, 44; Birds, 29; Reptiles, 8. For 1964 they are: Mammals, 39; Birds, 34; Reptiles, 4. To the end of June of this year species figures are: Mammals, 29; Birds, 14; Reptiles, 1. The legend on the panel gives the background of the breeding effort: "When wild animals are not adequately protected in their homelands, it becomes increasingly important to breed them in captivity. This we are doing, more and more each year, in the Bronx Zoo. The breeding program is so successful that we can now send many rare species to other zoos. The bird collection especially is productive. Some birds rear their own young, but we gather about 1,500 eggs annually and incubate hundreds of the less common species."

Sun Bittern Nesting. The adults, nest, egg and young of the Sun Bittern shown on the cover of this issue of *Animal Kingdom* are the current excitement of the Aquatic Birds Building, and visitors cluster around the Swamp Scene all day long to watch the parents feed the chick and display protectively when other birds approach. It is the first time this lovely South American bird has reared young in our collection, although it has been bred a few times in other zoological collections.

Crandall Book Reprinted. The University of Chicago Press has published a second impression of "The Management of Wild Mammals in Captivity" by General Curator Emeritus Lee S. Crandall, originally published in July of 1964. The new impression contains an Appendix updating many longevities and other records. The price is still $13.50.

Prairie Dogs and Fish. The Zoological Park and the Aquarium were represented by exhibits in the "Animal Behavior" display in the Time-Life Building in Rockefeller Center during the early fall. Exhibits Designer Jerry Johnson and Mammal Curator Joseph A. Davis, Jr., created an elaborate series of tunnels for Prairie Dogs, and the Aquarium installed two tanks of fish. The Prairie Dog display will eventually be incorporated in our World of Darkness Building.

Auditorium at the Zoo. For many years the Zoological Park has urgently needed an auditorium where visiting groups could assemble for educational courses, programs and motion pictures. We are now preparing to remodel the unused basement lecture room of the Heads & Horns Museum to create a modern auditorium seating about 180 persons. Plans have been submitted to the New York City Department of Buildings and the auditorium may be ready for use early next spring.

Africa West. A new moated exhibit for small African animals has been created on the east side of the Kangaroo House, under the name of "Africa West." Eventually the whole area will be incorporated in the expanded African Plains exhibit. At the moment we are displaying Blue Duikers (*Cephalophus monticola*) and Maxwell's Duiker (*Cephalophus maxwellii*).

PUBLICATIONS OF INTEREST

CATERPILLARS AND HOW THEY LIVE. By Robert M. McClung. 64 pp., illustrations in black-and-white by the author. William Morrow & Co., New York, 1965. $2.75.

Varying his usual style of telling an animal's life story through a mildly dramatized series of events, Mr. McClung here presents straight facts about caterpillars. The language is easy and non-technical; the book is, of course, intended for children.

NORTH AMERICAN BIRDS EGGS. By Chester A. Reed. Revised and with a new Preface by Paul A. Buckley. 372 pp., profusely illustrated in black-and-white. Dover Publications, New York, 1965. Paperback: $3.00.

As the new preface to Reed's classic notes that "Private collections of wild birds' eggs are now outlawed by the Federal Migratory Bird Act." This fact should be stated clearly in any mention of the book, for, hard-pressed as many birds now are, robbing of nests for eggs could be a calamity for some. Indeed, this paperback revised edition contains an additional warning on Egg Collecting by Dean Amadon of the American Museum of Natural History. Reed's names and ranges have been corrected in accordance with the 5th edition of the A.O.U. *Check-list,* with some reference to Eisenmann's *Species of Middle American Birds.*

A GUIDE TO THE NATURAL WORLD and Index to the *Life* Nature Library. By the Editors of *Life*. 210 pp., illustrations in color. $3.95.

The concluding volume in the magnificently illustrated and authoritatively written "Life Nature Library" series of books, now complete in 25 volumes.

BIRD DISPLAY AND BEHAVIOR. An Introduction to the Study of Bird Psychology. By Edward A. Armstrong. Revised Edition. 431 pp., line drawings, frontispiece, 32 pp. of plates. Dover Publications, New York, 1965. Paperback: $2.50.

Edward A. Armstrong's name will be familiar to readers of *Animal Kingdom,* for he has written a number of authoritative articles for us about birds. The present work is a paperback version of his "Bird Display," first published in 1942, which was completely revised and enlarged and given the present title in 1947. Armstrong's work hardly needs an introduction to ornithologists, and this inexpensive reprint puts it in the price range of any student. The plates, several of which are from the Zoological Society's collection of photographs, are especially to be commended; they are crisp and clear.

ALMOST HUMAN. By Julie Macdonald. xi + 161 pp. Many photographs of living baboons and baboons in art. Chilton Company, New York, 1965, $5.95.

The story of an infant baboon that, after some tribulation, came to accept the author and her family as its "troop." Appended are accounts of baboon habits in nature, gleaned carefully from the literature, an interesting baboon "vocabulary" and a chapter on the baboon in art and legend. A helpful bibliography rounds out a book that should be read by everyone contemplating the adoption of a monkey of any sort.—L. S. CRANDALL

ANIMALS AND MEN. By Hermann Dembeck; translated from the German by Richard and Clara Winston. 390 pp., photographs and drawings. The Natural History Press: American Museum of Natural History, New York, 1965. $7.50.

The jacket calls this "an informal history of the animal as prey, as servant, as companion." Mr. Dembeck was formerly publicity director for German circuses. His book is entertaining reading, but hardly a reliable reference work.

New Members of the New York Zoological Society

(Between July 1 and August 31, 1965)

Associate Founder

Mrs. Milton Erlanger

Patron

Mrs. Thomas Hitchcock
Augustus G. Paine, II

Life

Miss Pamela Prudence Golden
Miss Sibyl Rebecca Golden
Winston Guest
Dr. Kenneth E. Stein

Supporting

Dr. Carl Goldmark, Jr.
D. John Heyman
George Murnane, Jr.

Contributing

D. H. Acheson
Mrs. James Barr
Dr. Herbert V. W. Bergamini
Mrs. Sterling Boos
Mrs. Charles E. Dunbar
Milton Gelfand
A. Joseph Heckelman
Mrs. James C. Hirsch
Larry R. Johnson
Dr. Frederic T. Kirkham, Jr.
Lawrence W. Longstreet
Dr. Martin Mendelson
Mrs. John R. Palmer
Miss Janet C. Rigney
Mrs. Isabel P. Robinault
Dr. Howard N. Scal
Bernard Schwartz
Charles Schwartz
Jerome J. Sullivan
John Trimingham
Dr. Robert Unger
Hans B. Unser
Mrs. Earl K. Williams
Joel Witt
Mrs. L. A. Wyman

Annual

Mrs. Charles E. Albers
Mrs. F. Archibald
Miss Mary L. Barnes
Murray J. Baron
Mrs. Barbara R. Belkin
Mrs. Turner Bledsoe
Kenneth Bobrowsky
Francis E. Bosco
Mrs. Patricia V. Brady
David L. Brown
Vincent Buonamassa
Mrs. Marjorie H. Burnett
Dr. Walter Burnstein
Dr. Howard H. Buxbaum
Mrs. Alfred T. Copeland, Jr.
Harry Davis
Martin Robert Day
Vincent Di Mare
Mrs. Margaret R. Dimesa
Armando Florio
John Ripley Forbes
William J. Freedman
Leonard H. Friedman
Earl Geertgens, Jr.
Miss Margaret M. Gray
Robert M. Hallett
Richard Harbison
Robert Haughney
Miss Ellen Mary Herrburger
Miss Bertha M. Hohmann
Jack Hornstra
Charles P. Hostek
Edward A. Jerry
William A. Jones
David Junkin
Leo E. Kane
Albert Karp
Michael Kennedy
Mrs. Harriet Kerdell
Milton M. Laemle
Mrs. Albert H. Lemke
William Lohman
Mrs. G. Franklin Ludington
Miss Barbara P. McLaughlin
Mrs. Roland M. Machold
Dr. Leroy G. Meshel
Reuben Michlin
Mrs. E. Wise Mills
Miss Elizabeth T. O'Flaherty
Master Randolph M. Ostrow
Thomas W. Phelps
Carl F. Phillips
Mrs. Leroy G. Pittman
Mrs. Isobel Pollack
David W. Preven
Martin D. Quinn
William O. Randall
B. James Raz
Kenneth Rind
Peter Riviello
Alfred Rivlin
Kenneth C. Rogers
Mrs. Elsie L. Rosner
Martin Safran
Jay Schulman
Fred Schur
Abraham Shebert
Wayne Howard Siegmann
Nathan Sloan
Patrick E. Starkey
Sidney L. Steinberg
Edward F. Strobel, Jr.
Mrs. Dorothy Terahira
Melton Walden
Dr. George D. Whitney
Daniel S. Workman

QUESTIONNAIRE

What do the following have in common?

Angwantibo

Coligruezo

Yapok

Tenrec

Chevrotain

Solenodon

Bushbaby

Give up? Well, the answer is surprisingly simple.

All these curiously-named animals are living in our Small Mammal House right now—and a lot of other rarities as well.

Why don't you pay a fall visit to the Bronx Zoo and see them? It's a delightful time of year for Zoo-visiting. Crowds drop off after Labor Day and fall color is at its brightest in October.

The animals—and we—will be glad to see you.

Membership Department
The Zoological Park
Bronx, N. Y. 10570

QL
1
N5X
NZP

VOL. LXVIII • No. 6 • NOV.-DEC., 1965

ANIMAL KINGDOM

NEW YORK ZOOLOGICAL SOCIETY

General Offices: 630 Fifth Avenue, New York, N. Y. 10020

PRESIDENT Fairfield Osborn

VICE-PRESIDENT Laurance S. Rockefeller

SECRETARY John Elliott

TREASURER David Hunter McAlpin

ASSISTANT TREASURER Eben W. Pyne

EXECUTIVE COMMITTEE

Laurance S. Rockefeller
Chairman
George F. Baker, Jr.
John Elliott
Henry Clay Frick
Peter R. Gimbel
Robert G. Goelet
John N. Irwin, II
David Hunter McAlpin
Fairfield Osborn
John Pierrepont

Ex-Officio:

The Mayor of the City of New York, Hon. Robert F. Wagner

The Commissioner of Parks, Hon. Newbold Morris

BOARD OF TRUSTEES

Class of 1966
Robert E. Blum
William R. Coe
C. Suydam Cutting
Henry Clay Frick
Anthony D. Marshall
Otto Marx, Jr.
David Hunter McAlpin
G. W. Merck
Augustus G. Paine, II
Richard C. Patterson, Jr.
John H. Phipps
Alfred G. Vanderbilt

Class of 1967
Alexander Aldrich
George F. Baker, Jr.
John Elliott
Robert I. Gannon
Peter Grimm
Fairfield Osborn
Eben W. Pyne
Laurance S. Rockefeller
John M. Schiff
Henry Sears
Joseph A. Thomas
Robert Winthrop

Class of 1968
Charles W. Engelhard
Peter R. Gimbel
Robert G. Goelet
John N. Irwin, II
Warren Kinney
Peter Matthiessen
Howard Phipps, Jr.
John Pierrepont
David T. Schiff
Chauncey Stillman
Landon K. Thorne, Jr.

STAFF: Zoological Park, Aquarium & Other Society Activities

William G. Conway . . . *Director, Zoological Park*
Paul Montreuil . . . . . *Director, Aquarium*
John Tee-Van . . . . . *General Director Emeritus*
Christopher W. Coates . *Director Emeritus, Aquarium*

ZOOLOGICAL PARK

Joseph A. Davis, Jr. . . . . *Curator, Mammals*
H. Bradford House . . . *Assistant Curator, Mammals*
Grace Davall . . *Assistant Curator, Mammals & Birds*
Roland Lindemann . . . . . *Consultant in Mammal Management*
William G. Conway . . . . . *Curator, Birds*
Joseph Bell . . . . . *Assistant Curator, Birds*
Herndon G. Dowling . . . . . *Curator, Reptiles*
Victor H. Hutchison . *Research Associate in Herpetology*
Allen Vinegar . *Visiting Research Fellow, Herpetology*
Charles P. Gandal . . . . . *Veterinarian*
Gordon Cuyler . . . . . *Membership Chairman & Administrative Associate*
Herbert J. Knobloch . . . . . *Curator, Education*
Jerry M. Johnson . . . *Designer, Dept. of Exhibition*
Charles B. Driscoll . . . *Superintendent, Operations*
Edward Kearney . . . . *Manager, Facilities Dept.*
Lee S. Crandall . . . . *General Curator Emeritus & Zoological Park Consultant*

AQUARIUM

Carleton Ray . . . . . *Curator*
Joseph R. Geraci . . . . . *Associate Curator*
Jewell Bungay . . . . . *Business Manager*
Louis Mowbray . . *Research Associate in Field Biology*
Aage Olsen . . . . . *Superintendent*
Guido Chibas . . . . . *Associate Superintendent*

OSBORN LABORATORIES OF MARINE SCIENCES

Ross F. Nigrelli . . . . . *Director and Pathologist*
C. M. Breder, Jr. . . *Research Associate in Ichthyology*
Harry A. Charipper . . *Research Associate in Histology*
Thomas Goreau . *Research Associate in Marine Ecology*
Sophie Jakowska . . . . . *Research Associate in Experimental Biology*
Klaus Kallman . . . . . *Geneticist*
John J. A. McLaughlin . . . . *Research Associate in Planktonology*
George D. Ruggieri, S.J. . . . *Research Associate in Experimental Morphogenesis*
Martin F. Stempien, Jr. . . . . *Research Associate in Bio-Organic Chemistry*

GENERAL

Walter Lerchenfeld . . . . . *Comptroller*
Harold C. Palmer . . . . . *Assistant Secretary*
John J. McKew . . *Personnel Manager & Assistant to the Director, Zoological Park*
William Bridges . . . . . *Curator, Publications*
John L. Miller . . . *Associate Curator, Publications*
Dorothy Reville . . . . . *Editorial Assistant*
Sam Dunton . . . . . *Photographer*
Henry M. Lester . . . . . *Photographic Consultant*

DEPARTMENT OF TROPICAL RESEARCH

Jocelyn Crane . . . . . *Director*
Michael G. Emsley . . . . . *Assistant Director*

Associates

Jane Van Z. Brower
Lincoln P. Brower
William G. Conway
Julie C. Emsley
William K. Gregory
Donald R. Griffin
David W. Snow
John Tee-Van

AFFILIATE

L. Floyd Clarke, *Director*
Jackson Hole Biological Research Station

ANIMAL KINGDOM

NEW YORK ZOOLOGICAL SOCIETY

VOLUME LXVIII

JANUARY TO DECEMBER, 1965

Numbers 1-6

ANIMAL KINGDOM

Bulletin of the New York Zoological Society

In This Issue

Kissing Gouramis
Sam Dunton **Front & Back Covers**

Australia's Little "Needle-in-a-Haystack" Marsupial
David Fleay **162**

Birds in a Costa Rican Garden
Alexander F. Skutch **168**

Seal Island
Paul Montreuil **173**

Daily Scenes in Our New Home for Water Birds
Color Photographs by Joseph F. Morsello **175**

Messages in the Wild
Margaret Altmann **179**

Boa Constrictor: from Tropical Menace to Popular Pet
Herndon G. Dowling **183**

Behind the Scenes **186**

Index to Volume LXVIII **191**

Vol. LXVIII DECEMBER 1965 No. 6

Issued bi-monthly by the New York Zoological Society at the New York Zoological Park, Bronx Park, Bronx, N. Y. 10460. Editorial and Subscription Offices at the same address. Title registered with United States Patent Office • Subscription, $3.50 a year; single copy, 60 cents. Same rates for all foreign countries and Canada. Second-class postage paid at Bronx, N. Y. Send Form 3579 to Bronx, N. Y. 10460.

Let's Call It— Progressive Evolution

AS THE YEAR goes towards its end and the bleak days of winter come, we still dream of the radiant days behind us but yearn for the new life that will come with another year. An analogy, even though a somewhat remote one, suggests itself as these year-end thoughts concerning our Society are written.

We have indeed had a radiant "season" — in several respects an extraordinarily fruitful one. Ideas and plans, long germinating, have become realities. The new Laboratories of Marine Sciences are in mid-construction and will be ready during the coming year to press forward into many still unexplored regions of knowledge concerning marine life. The new Institute for Research in Animal Behavior is now well-established as a joint enterprise with the Rockefeller University. It will be under the direction of an initial staff of the highest scientific competence. Also, and far from least important, much effort has been directed to "spark" or assist programs for the protection of threatened wildlife in various parts of the world where the crisis is most acute.

At the Zoological Park, as well as at the Aquarium, new and imaginative techniques are being brought into play to carry out a far-ranging program of new buildings and exhibits. These will provide environments for the animal collections as similar as possible to those in which they live in nature. The recently opened Aquatic Birds House has proved a brilliant success and is a precursor of many other improvements that are part of the entire program now under way.

As might be expected, the response by the public to these activities is evidenced by a steady and considerable increase in the number of visitors at both institutions, bringing their combined annual attendance to well over 3,000,000 people. At the same time, our membership has surged forward and recorded a larger increase than in any previous year.

A new year lies ahead, and with it the promise of continued and perhaps greater fruitfulness stemming from the "plantings" that have been made in this and previous years. Let's call it "progressive evolution."

Fairfield Osborn

Australia's Little "Needle-in-a-Haystack" Marsupial

By DAVID FLEAY
Fleay's Fauna Reserve, West Burleigh, Queensland

DRIVING NORTH up the Bruce Highway in Queensland on a hot October afternoon in 1956, we entered a cutting on a range beyond Gunalda, en route for the nesting territory of Wallaville Barking Owls near Gin Gin.

Walled by great blocks of basaltic (andesite) rock, this Gunalda cutting 20 miles north of Gympie remains forever etched in my memory because it was the unexpected setting for my first meeting with a member of Australia's genus of tiniest marsupials.

Halfway up the grade, a minute furry creature appeared as it skipped momentarily on the roadway ahead of the truck. Stopping the vehicle as abruptly as possible, I raced back only to find nothing stirring and absolutely nothing in sight. About me only the black bitumen strip sizzled in the uninterrupted glare of the sun. Then I perceived what was apparently a very small and very ordinary mouse "frozen" in that uncomfortable, unfriendly waste in the hope of avoiding detection. A careful stalk and a quick grab, and thus it was for the first time I met a midget among marsupials that I recognized as a planigale only from what I knew of its description in textbooks. In fact, scarcely anyone knew a thing about planigales.

Perhaps the most startling initial impression was the disproportionate size of the scrotal sac of this male specimen. Typically, as I later found, it filled almost the whole of the external abdominal area.

Superficially, although it was smaller, this dark-nosed Lilliputian bore the closest resemblance in color, shape and eye size to the common mouse, but it was browner and with limbs not so long; its eyes were even smaller (compare, for example, the very large eyes of Sminthopsis, Dasycercus, Antechinus and Phascogale), its hairy ears were wide and close set to the head while the jaws possessed a terrific gape with many teeth. This flat-headed, wide-skulled, pin-eyed little fellow was none other than Ingram's Planigale, and planigales are recognized not only as the smallest but the least known of the lesser pouched animals. Most adult specimens weigh less than a quarter of an ounce apiece, and yet a female may carry a pouchload of nine babies at a time.

Sad to say, in spite of accommodation in a grass-filled box, little Ingrami was with us on the further journey for only half an hour. Apparently uninjured at the time of our meeting, he may have suffered prior heat stroke, shock or perhaps had been dropped by a feathered predator. Whatever the cause, it was a great sorrow to have the little fellow die so soon, for despite years of search, this remains one of a mere two meetings I ever had with planigales in the field.

At the time, the incident touched off terrific enthusiasm but subsequent trips to the Gunalda Range proved that a deliberate hunt for planigales is useless. Crawling for hundreds of yards beneath lantana thickets at the mercy of scrub ticks while setting all manner of choicely-baited box traps, laying trails and quietly spotlighting by night, all proved fruitless. I found myself sympathizing wholeheartedly with G. H. H.

Wood shell covering abruptly removed, the mother planigale churrs angrily at the disturbance to her grass nest arranged from material she gathered. The tiny animal weighed a quarter of an ounce.

All photographs by the author.

Tate of the American Museum of Natural History who in 1937 began intensive trapping of a great rock-strewn slope at Rona Falls, Port Moresby, following the exciting capture of the one and only *Planigale novaeguineae* known to science. His further efforts, too, were fruitless.

My brief encounter with the planigale was but a four-year-old memory when, on February 27, 1960, a packet arrived with a live animal inside. It came from G. A. Main of Mungungo, Monto, Queensland, who had written me that he found the creature while turning over stacked posts alongside blady grass. He described it as a sharp-nosed animal scarcely half the size of an ordinary mouse.

Cutting the wrappings off the container, I expected either an Antechinus or Sminthopsis – we receive many – but imagine my shock! For there, peeping at me out of the wrappings, was an adult female *Planigale ingrami* with seven newly-furred youngsters anchored behind her by merciless tooth grips on the teats in her pouch.

Here at long last, delivered to me on a platter, was not one but *eight* of the least known marsupial "mice."

Thoroughly interested by the fact that Madame "Mouse" ate more than her body weight of grasshoppers daily, Mr. Main had flown her down to me for a look, little realizing that he had given us the means of investigating a badly-needed life history.

The flat-headed little mother had a maximum depth of skull from base to crown of slightly more than an eighth of an inch — a lizard-like flattening that had evidently been evolved as a result of the specialization of the species for slipping into narrow rock crevices and cracks in the ground or in logs and dense undergrowth. Her family of seven included six males and one female, a proportion not uncommon among dasyurids. Her grass nest was built in a hollowed out "seat" beneath a shell of wood and, like other dasyurids with unenclosed pouch, she dragged the babies over all obstacles in her path as she came forth, even in broad daylight, to seize mealworms, field crickets and paralyzed spiders robbed from mud-dauber wasp nests. Even the juicy larvae and pupae of the wasps themselves were devoured.

Captivity in a large earth-floored box with only gauze wire in the roof worried the little pin-eyed mother not in the slightest and at all times she maintained a small, neat, saucer-shaped nest of dry grass beneath concave shells of wood and bark. Once in deeper grass she constructed a more elaborate nest not unlike that of the Blue Wren.

Within a fortnight she tucked away her seven dwarfs in the "nursery" and hunted untrammeled at night for the immense quantities of insect food she needed. Calculations revealed that she now consumed more than her body-weight in grasshoppers daily. Large locusts or winged grasshoppers were prime favorites and such quarry usually exhibited far greater strength than the tiny hunter. But size of the victim meant nothing to this mighty midget, for she clung fiercely even through aerial rides when big grasshoppers tried space jumps to dislodge her — sometimes clearing the length and breadth of the enclosure a number of times before succumbing. Beneath the wooden shells, the pile of discarded grasshopper legs, wings and other tough sections grew apace.

If she was handled, she immediately seized a finger in her widely-opening jaws to exert the greatest pressure possible. Being so small, her tiny teeth scarcely penetrated the skin but her dogged determination in pinching hard and hanging on were remarkable.

By June all her youngsters were sub-adult in appearance and the males, as expected, were beginning to exceed the female in size (though never excessively so as in Antechinus). Only on the rarest occasions did they cling to her back

and sides (a common method of carriage in Sminthopsis).

The youngsters and their mother were if anything more rapid in ground scurries than the common mouse, in great contrast to *Sminthopsis crassicaudata*. When disturbed, they "melted" in lightning dashes to the cover of the next available shelter or into thick grass. They seldom climbed, although they were quite adept at it. When left alone they had a habit of sneaking quietly into sunlit spots and basking at full stretch like a crowd of lizards.

Their speed of movement is, in my opinion, the main reason why planigale nests are more often discovered beneath debris than the animals themselves. They go underground quickly when they sense a disturbance. Sometimes by sneaking quietly to the cage by night (planigales are mainly nocturnal though given to odd daylight forays and much sunbasking) their vocal sounds could be overheard. These consisted of twittering

Restrained by the tail, the little dark-eyed creature retaliates on the author's finger with little hope of penetrating the skin. The depth of her skull was about an eighth of an inch.

sibilant notes so rapid as to be almost a vibration. In this respect they reminded me strongly of insectivorous bats.

The general insect-seeking habit of these midget marsupials gives way under opportunity to a scavenging carnivorous trend. One of the youngsters sickened and died in the enclosure, only to be devoured immediately by its relations. Dead sparrows or any small defunct birds for that matter were reduced to skeletons within a matter of hours – in fact one sparrow in particular was cleanly picked in less than 50 minutes.

Since the arrival of the Monto animals we have maintained planigales at West Burleigh almost continuously into 1965, breeding them twice, the first occasion (Summer 1960-61) also being a record for captivity even though only three offspring reached maturity. The little creatures obviously are mature at the age of less than twelve months.

Our first success began with one of the young Monto pairs isolated for the purpose because of the cannibalistic tendency of most carnivorous and insectivorous marsupials towards new born young.

Embryos (of which the greatest number seen in a pouch area at one time totalled nine) appeared during the last days of December, 1960. Possibly as in the case of the Yellow-footed Pouched Mouse (*Antechinus flavipes*) the number of teats and therefore the number of young supported at one time is variable. Plate Eight in *Victorian Naturalist,* Volume 65, 1949, shows a photograph of mine featuring a Yellow-foot with the extraordinary total of 12 newly born young attached to 12 teats

With our mother planigale we were careful not to hold many inspections to observe the progress in her nest, for one of this little animal's sisters ate or otherwise disposed of her family in apparent protest at forcible prying. The father was removed for his family's good, and the mother began to weave dry grass blades and stalks into an extra-comfortable structure beneath curled bark. She resented even the slightest interference quite fiercely; any lifting of the cover automatically brought her wide open jaws churring angrily through the top of the nest. She bit hard and refused to budge.

By mid-February at five-to-six weeks the gray, crisp-furred pouch young hung tenaciously to the teats most of the day but for the first time could be left at home while the mother went off in search of food. Her appetite for chafer grubs, crickets, grasshoppers, spiders, meal grubs and steamed egg was always good, but now, as in the case of her own mother the previous year, it became phenomenal.

Because of her anchorage during daytime by well-grown youngsters gripping her elastic teats, the mother planigale was handicapped in her usual lightning tactics and I had the only reasonable opportunities for taking pictures of the subject. Nevertheless pictorial difficulties were ever present and inevitable in an animal so tiny, so very restless and so fast. One humorous episode concerned the sudden disappearance of the mother with pouch-attached babies up the trouser leg of a photographic assistant, followed minutes later by her reappearance with youngsters still in tow at the neck of the same fellow's shirt!

By the end of March the youngsters had reached about half their full growth and any lifting of the wooden shell covering the nest sent them scattering in all directions. Now after three months in the care of the mother they were capable of an independent existence.

Though literature on the subject tends to leave one with the impression that planigales haunt rock-strewn areas and, of course, as in the Gunalda experience, they definitely do, subsequent contacts have given me new horizons.

In March, 1961, Messrs. L. Farrell and G. Lynn were cutting firewood on a saw bench on Gin Gin cattle station when a planigale (unrecognized as such) with well grown family attached fell from a cavity, nest and all. Taken alive to Eric Zillmann who guessed their identity, they were eventually forwarded to me. Once again it was a confirmed Ingram's Planigale, this time inhabiting shelter provided by a fallen hollow limb in timber country.

"Madame Mouse" was under a decided handicap in her daytime movement by well-grown youngsters gripping her elastic teats. Moments like these offered the only real opportunities for pictures.

Following heavy rain in early April, 1964, and the inundation of the Burleigh-Miami peat swamp in southeastern Queensland, the whole area with marginal exceptions became partially flooded and generally soggy. At this time an observant 13-year-old school boy, Stephen Williamson by name, who happened to be hunting displaced snakes, turned over some old sheets of iron on the edge of the marsh. Thinking the "mouse" he captured in a sketchy little nest was "different," he brought it along and all of us were delighted when its identity proved to be that of an immature male Ingram's Planigale. Fired with enthusiasm over his discovery, young Williamson searched the swamp and its environs for months on end. Scarcely a sheet of derelict galvanized iron, masonite or timber remained unturned anywhere. On December 23 of the same year his rummaging beneath a pile of old three-ply in dense forest of coarse, high grass beneath Swamp Mahogany Gums (where field crickets abound) paid off. He arrived with an adult female showing a pouch area in the state associated with the feeding of advanced young. These were evidently in a nearby nest but so great was the profusion of tall, rank vegetation in the area that we failed to find a trace of the nursery. Therefore, we turned the tiny mother loose to continue the care and management of her babies which could not yet have attained an independent age. The rapidity of that Lilliputian's exit into the jungle of dense growth was magical! Certainly, members of the species shine not only in penetration of narrow crevices in rock but also in their swift ease of movement through the blady grass cover so common in much of coastal Queensland.

Importantly, some new occurrences of *Planigale ingrami* from Monto through Gin Gin to Burleigh Heads and Numinbah extended the range of the tiny animal some 800 miles further south coastally than the Townsville-Mackey limit previously established for the native of the north. It is indeed most likely that the minute size of the marsupial, coupled with its extremely mousy appearance, rapid movement and general elusiveness, cause the casual observer to overlook or miss it altogether. Additionally its appearance under ready-made shelters following heavy rain is due rather to eviction from the variety of cracks, crevices and other hiding places normally dry and snug rather than to its increase in numbers, as was formerly supposed.

In time, members of our needle-in-a-haystack genus (two species with three subspecies of *ingrami?*) may prove to be more numerous and widespread than is presently known. They do manage, however, to remain most successfully hidden!

BIRDS IN A COSTA

Photographs by the author.
Drawings by Don R. Eckelberry.

NORTH AMERICANS familiar with only two or three kinds of tanagers that are largely red, or red and yellow, have no conception of the variety of colors displayed by this great family, all of whose 200 species are confined to the Western Hemisphere, and nearly all to the tropics. I recall with amusement the trouble I had identifying a pretty blue and blue-gray bird that I found common in Panama on my first visit years ago. To the novice I then was, it looked more like a dove than a tanager. Another surprise awaited me in eastern Ecuador: a large, long-tailed, golden-eyed bird clad in a bold pattern of black and white, the well-named Magpie-Tanager. In the wet forests of the same region, I became familiar with the Red-rumped Paradise Tanager, a gem whose South American name, "Siete Colores," exaggerates only slightly. At least I could distinguish six of the seven: red, golden-green, turquoise, lavender, purple, and black — surely a variegated attire for a feathered creature hardly six inches long!

The Paradise Tanager belongs to the large genus *Tangara,* a name which is too easily confused with *Tanagra,* that of the genus of tanagers which includes the little golden and blue-black euphonias. It would be difficult to find anywhere in the world a genus of small birds that exhibits a greater variety of color patterns than *Tangara.* These elegant little tanagers are most abundant in the heavily forested foothills of the American continents, from southern Mexico to Bolivia; but they are by no means absent from the hot lowlands, and a few are at home on cool, stormy mountain heights. All these tanagers are largely frugivorous, but they vary their diet with insects. A favorite method of foraging is to hop along horizontal branches and bend over, now on this side, now on that, to see what insect or spider may be hiding in the bark or moss beneath the branch. They also glean insects from leaves and flowers.

Despite the brilliance of most of these tanagers, the females so closely resemble the males that they can be distinguished only with difficulty, or not at all. Those with which I am familiar re-

RICAN GARDEN

By ALEXANDER F. SKUTCH

San Isidro del General, Costa Rica

A portion of the garden and the feeding platform where the author studied the activities of the Speckled Tanager. Above left—A drawing of this tame and strangely confiding bird.

main mated throughout the year. The pairs often roam through the treetops in company with other small birds. Unlike many other members of their family, the species of *Tangara* that I know are poorly endowed with song. From some I have heard only series of sharp *tick's,* or low, insect-like notes. Theorists of an earlier generation believed that nature, governed by a principle of economy, parsimoniously withheld song from birds which she had lavishly endowed with color. Modern ornithologists have observed that birds of various kinds sing most freely when separated from their mates. Since these tanagers are so constantly with their partners, perhaps their vocal organs have degenerated, in the course of evolution, because they were used so little.

On our farm in the valley of El General in southern Costa Rica, four species of *Tangara* reside throughout the year. Three, the Golden-masked, the Silver-throated, and the Speckled, come regularly to eat bananas on the feeding shelf in a guava tree beside our house. The fourth, the Bay-headed Tanager, comes rarely; it likes bananas less than wild berries, especially those of *Lycianthes synanthera,* a shrub with attractive lavender flowers that grows as an epiphyte on the trees in our garden. The males of the species of *Tangara* that come to the feeder may sometimes be seen, especially as nesting begins in March and April, to pass billfuls of banana to their mates, who have been helping themselves freely from the same fruit.

The least abundant of the four species of *Tangara* here in El General is the Speckled Tanager, yet it is not rare. This bird, which was formerly known as the Yellow-browed Tanager (a loose translation of its scientific name, *Tangara chrysophrys*) has a color pattern unusual not only in its genus but in its family as a whole. It is heavily spotted with black over most of its bright green upper plumage as well as its whitish under parts. Its curious appearance is accentuated by a heavy black mark between the base of its black bill and its dark eye, above which is the yellow brow from which it receives its specific name. In some pairs, the male is more heavily speckled than the female, but this may be a matter of age, as young birds are more lightly spotted than adults.

Family bonds are strong in Speckled Tanagers, which between breeding seasons are often seen in groups of three or four, evidently parents with full-grown young. Their call is a short, clear, somewhat bell-like note. Their song, if song it may be called, consists of a series of similar short, clear notes, repeated with increasing rapidity until

they almost form a trill, which seems to taper off to a sharp point as the hurrying notes diminish in volume. Speckled Tanagers are tame and confiding. One morning, impatient for their breakfast, they came right up on the porch to peck at the bananas that I had laid on a table, before taking them to the shelf in the garden.

In El General, I have found eggs of the Speckled Tanager from April to June, but chiefly in May. The breeding season is evidently much longer than this, for I have in several years seen parents feeding fledglings in October and even early November. The dozen nests that I have found were in trees and shrubs, near but not in the forest, from four to 30 feet above the ground. Only two, however, were below 10 feet. As in all species of *Tangara* of which I have information, the nest of the Speckled Tanager is a compact open cup. It differs, however, from that of its three relatives in this valley in the absence of living moss, liverworts, or diminutive epiphytic ferns, which give their green color to the outside of the nests of the Silver-throated and Bay-headed species. The Speckled Tanager's nest is composed of such dry materials as the fine, curling secondary rachises of the twice-compound leaves of the climbing mimosa, with a middle layer of small leaves or strips torn from larger ones, and a lining of horsehairs or the black fungal growths that resemble them and are sometimes called "vegetable horsehair." The nest is bound together and attached to its support by cobweb, and in the bottom are usually a few pieces of gray foliaceous lichens that grow on the bark of trees. Both sexes of the Speckled Tanager cooperate in building the nest, as is usual, but by no means invariable, in the genus *Tangara*. As a rule, they arrive together with material in their bills, and each in turn enters the nest to place what it has brought and shape the structure. Occasionally one passes its contribution to the other who is already sitting there. During intermissions in the work, the male may feed his mate.

In May, some years ago, I found a pair of Speckled Tanagers building a nest amid clustering foliage, far out on a horizontal limb of a red-flowered poró (*Erythrina*) tree in our garden. The female's right foot had somehow been so severely injured that it was quite useless; she always held it up when she perched. Probably because of her impediment, she and her mate worked slowly and built an unusually slight and shallow structure, which seemed unfinished when it received eggs at the end of the month. The set consisted of two, the number of eggs I have always found in nests of this and other species

Of the four species of tanager, the Bay-headed was the least frequent visitor at the garden feeder, preferring wild berries to bananas. Right — Valley of the Rio Pena Blanca, where the four forms of tanager are seen all year.

of *Tangara*. The shells were dull white, heavily mottled with brown, especially on the broader end.

I did not watch the lame female incubate, but doubtless she carried on this task alone, as at other nests of the Speckled Tanager that I studied, and as seems to be true throughout the tanager family. Probably while attending her nest she was fed by her mate; one male Speckled Tanager fed his incubating partner 10 times in a day, but she needed more food than this and had to forage for the rest. After a few days, one egg vanished from the nest in the poró tree, probably having fallen from the shallow structure. The other egg required at least 15 days to hatch, which is a day or two longer than normal. Evidently the crippled female, unable to forage with full efficiency, prolonged her absences from the nest while she hunted for food. A sound Speckled Tanager leaves her nest about 15 times each day, for intervals that rarely exceed 20 minutes, and she keeps her eggs covered for 75 to 80 per cent of the daytime.

The nestling was of the usual tanager type, with pink skin shaded by sparse gray down, tightly closed eyes, and a mouth that revealed a red interior when lifted up, gaping widely, for food. After it hatched, I devoted more time to watching the nest. Its mother's right leg had not improved while she was incubating; there was a prominent swelling at the ankle joint and it was twisted inward. From her stance when resting on a twig, one would hardly suspect that she perched on one leg, holding up the useless limb. Sometimes while standing beside the nest, however, she rested her half-spread right wing against the rim, to help support herself. Her movements at the nest at times appeared slightly clumsy, suggesting her impediment; yet, on the whole, she carried on her parental activities remarkably well.

The severity of the female tanager's handicap was more evident when she visited the feeding shelf, which had recently received a coat of asphalt paint for cleanliness and preservation. When wet from the showers so frequent at this season, the board was so slippery that the lame tanager found it hard to stand. To support herself, she sometimes rested on her whole lower leg or tarsus, also putting down her bad leg, which I never saw her do while she perched on a twig. In this unnatural posture, it was difficult for her to push her bill into the firm fruit and remove a bite. While trying to do so, she slid around pathetically, and after taking a few nibbles of banana, flew off. Other birds were hardly troubled by the glossy black surface of the board. Planting both feet firmly on it, they easily removed pieces of the banana, or they stood on the fruit while they ate it.

I applauded the indomitable spirit of the female tanager, faithfully attending her nestling despite her severe impediment. On the morning when it was a week old, she brooded it two-thirds of the time with sessions that lasted about a half-hour. She fed the nestling only two or three times in three and a half hours, while her mate brought food 12 times. When he arrived with a billful while she was brooding, he might pass it to her for delivery to the nestling, or he might give part of the food to her and the rest directly to the nestling. Once, while the female was giving the nestling food that he had brought to her, he reached over her back and fed it at the same time – a charming sight.

As the nestling grew older, it became evident that it had *three* attendants. The helper was a Speckled Tanager in adult plumage, indistin-

guishable from the lame female's mate. Sometimes the three arrived or flew off together; but more often the two parents came to the nest together, while their voluntary assistant, of unknown sex, went its own way. During nine hours of watching when the nestling was 12 to 15 days of age, its father and the helper fed it a total of 62 times, while the crippled mother, who was certainly doing her share, fed it 52 times. Doubtless the father was bringing food more often than the helper. In all, the nesting was fed 114 times in nine hours, or at the rate of 12.7 meals per hour. The food was carried largely in the attendant's bulging throat or inside its bill, only partly protruding, so that it was difficult to identify. Often I distinguished black berries, and sometimes the fleshy red arils that enclosed the seeds from nearby *Clusia* trees.

It is not unusual for parent tanagers of the genus *Tangara* to receive help while caring for their offspring. In the Golden-masked Tanager, the helper may be either a youngster from an earlier brood of the same season, easily recognized by its dull plumage, or an older bird indistinguishable from the parents. I once watched four Plain-colored Tanagers — Cinderellas of their brilliant genus — attending two nestlings. In Trinidad, four or five adults of the miscalled *Tangara mexicana* (which has never been found north of Panama!) often feed the young of a single brood.

The lame tanager brooded her nestling in the poró tree nightly until it was 12 days old. On its last three nights in the nest it slept alone, and it left at the normal age of 15 days. Soon after its departure, I found it perching on a neighboring fence wire. As I approached the fledgling, its three attendants ventured almost within my reach, voicing their sharp notes. Although well feathered, the fledgling flew weakly, and I easily caught it in the high grass where it tried to escape me. I set it in a bush for greater safety.

During the next two weeks, I often saw the crippled tanager carry billfuls of banana or plantain from the feeder, sometimes with two companions who also flew off with full bills. Then, 16 days after it left the nest, I noticed the youngster for the first time in the guava tree that held the shelf. It rested above the board while its lame mother carried up billfuls of fruit, which it received in dignified silence instead of the importunate clamor of some other young birds whose parents brought them there to be fed. For a full month after it left the nest, or until it was 45 days old, the young Speckled Tanager was fed by its mother and other attendants; but a few days before the end of this interval, I noticed that it also helped itself.

After mid-September, I looked in vain for the crippled mother. All the Speckled Tanagers that now came to the board for bananas, sometimes five at once, had two good legs. I hoped that one of them was the valiant lame female, now enjoying the use of two sound feet, but in view of the severity of her injury, this seemed unlikely.

Three years later, I noticed that four Speckled Tanagers were interested in a nest in a *Cordia* tree in view of my study window. When I held up the mirror to see the two eggs, all four came close, protesting. But after I set up a blind in order to watch the nest from a more advantageous position, the birds deserted it. Neighboring shrubbery had forced me to place the blind closer than I wished, but I never dreamed that these generally so confiding birds would be so touchy. This happened in mid-April. During the following months, the four tanagers continued to come together to the feeder. Then, one day in August, they arrived with two fledglings. Although the young birds already helped themselves to the fruit, at least three of the older birds were feeding them.

Until the following year, these six tanagers were often on the table together. I never noticed any discord among them; but one afternoon in January, when nine Speckled Tanagers were present, uplifted heads and harsh notes revealed mutual antagonism. Finally, two clutched together and fell to the ground, where they promptly separated. This inconsequential tiff was a greater display of violence than I have often seen among tanagers.

As late as February, the six Speckled Tanagers came to the shelf in the guava tree as a flock. The breeding season was approaching, and I wondered whether all would attend the same nest. But before building began, I went up into the highlands for a season with different kinds of birds, and when I returned in July the six no longer visited us together.

A Home for Rarities
At the Aquarium

SEAL ISLAND

By PAUL MONTREUIL

Director, New York Aquarium

A view of the Polar Ice and Sub-polar Rock sections of the Aquarium's remodeled Seal Island. Polar on left has Weddell and Crab-eater Seals. Sub-polar will have Fur Seals.

WORKING ON SEALS in their natural habitat and collecting them alive is probably one of the most exhilerating experiences in the rarely humdrum life of a marine zoologist. The awesome grandure of the frozen polar seas, the forbidding ruggedness and isolation of the reefs and coasts frequented by many of the polar and sub-polar species, never fail to impress one with the magnificence of unsullied nature.

We have long had one of the most complete collections of pinnipeds extant, and this has been a matter of considerable pride to us. We have not been so proud of their exhibition quarters in the old "Tripool," however.

What was needed, we felt, was an exhibit that would give the visitor some impression of the actual environment of these creatures in nature, some feeling for the habitats that must be preserved if we are to preserve the species.

The problem was eventually placed before Jerry M. Johnson, the Zoological Park's Designer in its Department of Exhibition, and he tackled it with enthusiasm.

Essentially we wished to reproduce three basic

The third section of Seal Island on the Boardwalk side represents kelp-rich, temperate rock and sand beach. The new display was officially opened to the public in late August.

ecological habitats: polar ice, sub-polar rock and ice, and, finally, a kelp-rich temperate zone rock and sand beach. We wished to create a feeling of closer proximity to the animals, and of openness, while actually increasing the distance between public and seals. Instead of one exhibit comprising three unimpressive puddles, we aimed at three totally different scenes of impressive dimensions.

Mr. Johnson's working model incorporated all this and more. A moat accomplished the seemingly contradictory function of enlarging the separation between animal and viewer, and yet creating the illusion of greater closeness. Glass panels and wood railing replaced the impractical and unesthetic concrete walls. Realistic gunnite ice- and rock-work served as separations, where we had previously had blank concrete and wood stall partitions. Altogether the effect achieved in the completed project surpassed even our own very high expectations. Some concern was expressed at first that the seals might frequently fall into the moat, but our conviction that most of them would not do so turned out to be right; the few who did enter the moat soon learned not to do it again.

Seal Island was officially opened at the end of August. The transformation took longer than we had expected, but it was well worth waiting for. We now have the most striking seal display we know about — and best of all, even the animals seem to appreciate their new quarters and are doing better in every way than before.

Renovations still remain to be done on two more of our major exhibits— the Oceanic Tank has already been made over — and we are confident that we can accomplish them with the same high standard that we have reached in Seal Island.

Daily Scenes in Our New Home for the Water Birds

Marsh, cliff, seashore, swamp and jungle stream — these are only a few of the homes of water birds exemplified in the Aquatic Birds Building in the New York Zoological Park. These color photographs were made in late summer and are now available in postcard form.

Without barriers between birds and visitors, birds of a dozen kinds live in the Marsh, and several are breeding.

Many rare and beautiful birds live around dark jungle streams. Rocks are man-made, plants real.

Guanay Cormorants an
Terns are fully at home a

mustached Inca
vering Sea Cliffs.

Water's edge birds of Pakistan, India, Nepal, Ceylon, the Eastern Gray Herons stand motionless.

What could be more realistic than The Shore? Waves, sand, even the sound of surf help create an illusion.

Gigantic cypress trunks draped with living Spanish moss give an eerie, half-light quality to The Swamp.

This might be a scene in India or China. It reproduces the home of the big Indian Wood Storks, along a stream.

A small part of the great collection of Flamingos. All six species are on exhibit, with no barriers to viewing.

All photographs by Joseph F. Morsello, Philadelphia, Penna.

MESSAGES IN THE WILD

By MARGARET ALTMANN

Biological Research Station, Moran, Wyoming
& University of Colorado, Boulder, Colorado

Author Margaret Altmann trains her glasses on the shore of a lake in the Teton wilderness country of Wyoming where elk and moose are the subjects for her behavioral research.
Photo by John Ackermann

AS I HAVE WORKED for many years in the Teton wilderness on the fascinating topics of Social Behavior in Big Game Animals (reported almost yearly in *Animal Kingdom*), I have become more and more aware of the important role played by the communication system within and between various animal groups.

Most people think of vocalization as the all-important means of sending a message in the animal world. But in the big game animals significant, although often over-looked, methods of communication are based on posture, gait, facial expression, position effect to group and, last but not least, smell or odor traces (olfaction).

Often a combination of several sensory systems is involved in sending a message. This can be a factor to safeguard signal transmission.

It may just be a band of elk, which did not anticipate a silent hiker at this place and hour. Most onlookers would make a summary statement: "The elk took off after a brief moment and, despite their hurry, did not bump into one another."

However, it does not tell what was really going on. Such a brief and hurried event unfolds a host of happenings for which our human sensory equipment is not always well trained or keen enough.

Here is where my behavior research work on social groups and communication in wild, free-

A pair of elk cows rested on a meadow as calves and yearlings romped, played tag games and explored the surrounding forest.
Photo by James R. Simon

A mature cow alert to a strange noise. Other elk followed her example, standing motionless, noses high, seeking a scent.
Photo by Steve Martin

ranging game animals comes in. Its goal is to study in sharp detail what actions take place and what events these actions precipitate in other animals.

Is a message of danger and a signal for flight involved? Is it understood by all individuals of the group? Is the sender of the warning message also the decision-maker for flight?

Is the message reception confined to the species of the sender, or do other animals in the vicinity benefit from it too?

These are just a few of the questions which we try to unravel in our mountain laboratory under the open, beautiful sky of the Teton wilderness country.

Let us follow the sequence of events in the case of the surprised elk band: An undisturbed elk group is at ease on a meadow surrounded by deep forest.

In the adult animals, grazing alternates with resting and chewing the cud. The elk calves and some of the yearlings are playing tag games and some are exploring the forest margin. The elk are widely spaced, a sign of peace.

Suddenly a noise is heard, a cracking branch or twig. No visible intrusion as yet. A mature cow gets up, ears forward, freezes to immobility gazing in the direction of the noise. All follow her example, stand motionless. Then the lead cow walks stiffly in a half circle, nose high, trying to get the scent of any intruder. As she moves her gait becomes more accentuated as a "warning gait;" she steps high and her raised forehead is a definite warning to all. The group takes notice, alerts, pulls closer together, shields the calves. A second later the lead cow makes a fast turning motion and the group jumps off in a tense but orderly sequence.

The intruding hiker would likely have noticed only the members of the disturbed elk band, but in reality the communication about this intrusion has reached further than that.

As the freezing posture by the elk is shown and as it yields to the warning gait, a distant moose bull, feeding in the willows of the lower meadow, notices the signal too. He raises his head, cocks his ears and scans the area. As is typical for his species, there is no rush or hasty movement, just alertness and a posture of standing his ground.

In contrast to this behavior, let us look at another dweller of this area. A rusty-gray Sandhill

Crane and his mate on the riverbank notice the alert. The nervous, high-strung birds flap their huge wings, scream in unison in their shrill and penetrating voice and take off to an alternate feedground.

This chain reaction of signals can at times be traced even further. It can involve a family of ducks (Golden-eyes) on the pond and a Coyote passing by the edge of the timber. Each of these species apparently "reads" or understands the universal warning message, but it will execute the alert or flight pattern in the specific way of its own kind.

We do not know, at this point, whether the message transfer to members of other animal species in the vicinity is merely a coincidence, or whether it can be intentional.

A wildlife scientist from South America told me that peccary hunters in his country observe the warning cry of high-flying hawks carefully, because this warning message about an intruder is given only when peccaries are present in the thick underbrush.

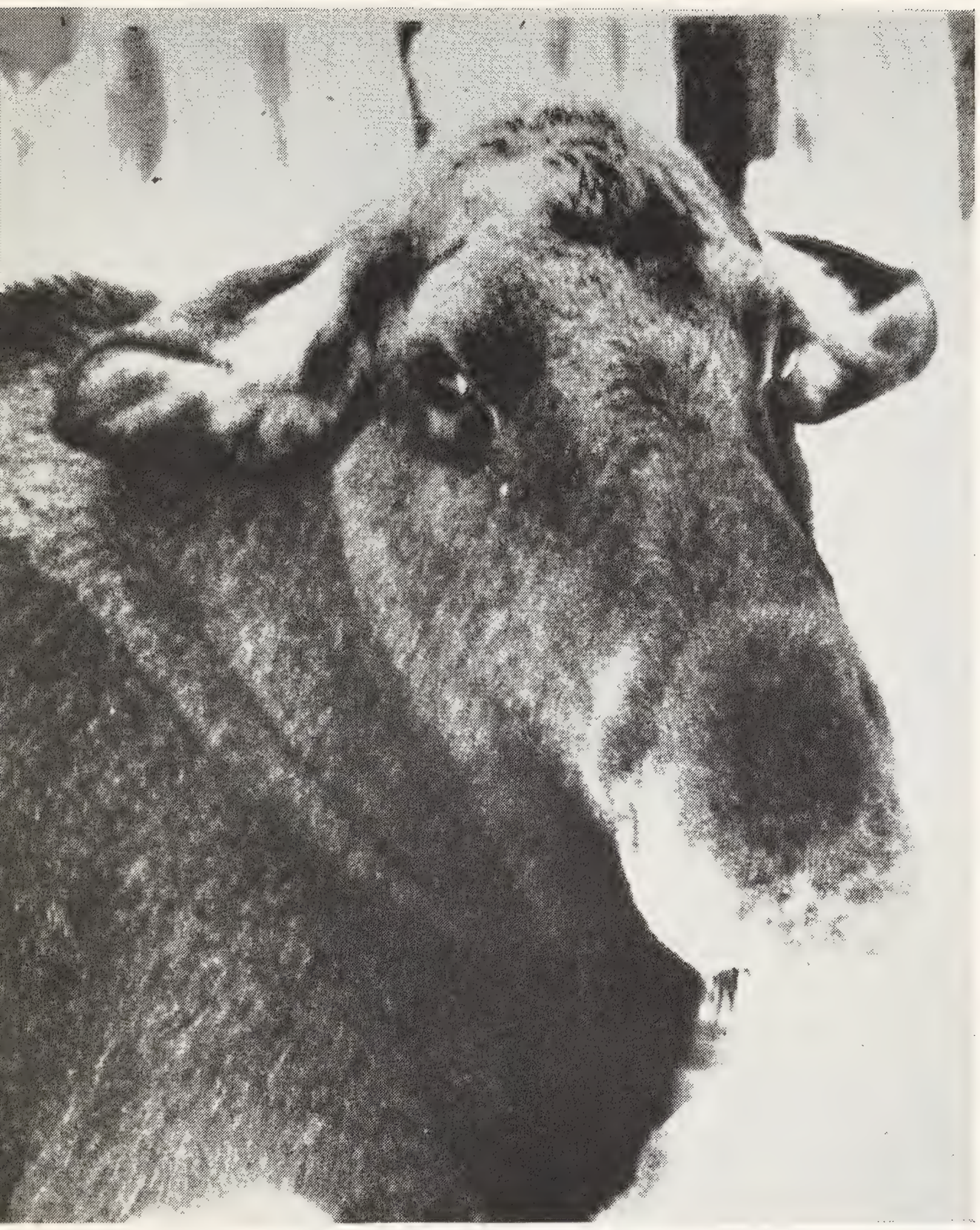
But there is more than just an "all or none" warning signal in animals. Finer distinctions or shades of information are also revealed by signals. For instance, the encounter with a harmless or a momentarily non-dangerous animal has to be also communicated to the group and particularly to the inexperienced young of the species. There are, I found, a number of ways to indicate various degrees of non-aggression and tolerance within and between species. For example, when a minor moose is meeting a big, imposing bull moose the following situation will ensue: The big moose looks intently to see who is coming, makes a few swaying and slow-motion steps toward the other moose, then stops. The minor moose indicates at once his non-offending intentions by small, fast steps and by looking past the mighty one. He also swerves his direction a bit so as to bypass the big one. Eager browsing or grazing is also a sign of non-hostility in such situations. Such action is immediately understood by the big moose, who will also resume browsing as a sign of non-aggression.

The transmission of messages containing negative character was also observed to occur between species. Thus I noticed that a predator, in this case a Grizzly Bear, engaged in a non-hunting activity such as foraging clover blossoms or berries, was not causing an alarm reaction in nearby grazing elk and mule deer. The non-aggressive mood of the bear is "read" by the other animals in his environment. Such a signal of security has only temporary character and is terminated at once when the bear shows changes in intention by gesture and gait.

Expression of the message of extreme hostility can be studied very well in a cow moose with a young calf. When facing an intruder, be it another animal or a human being, she will turn into a veritable bundle of potential dynamite and

A big bull elk, his antlers still in velvet, adopts a warning gait that is unmistakable to the herd. His walk is stiff and high-stepping; his raised head is a danger signal for all.

Photo by the author



Faced by an intruder, a cow moose with a young calf becomes potential dynamite. The ears are folded back, mouth begins to chew and salivate and eyes gleam, showing white.

Photo by H. Hediger

signal her rising anger unmistakably. This is done by facial expression; the ears are folded back, the mouth begins to chew and salivate, the eyes gleam and show the white at the corners, the hair stiffens on neck and back — the most definite indication of emotional arousal. The front feet may stamp the ground a couple of times, and the calf is subtly motioned to stay back in case of an attack. It appears that every living creature understands this message and will yield. Even the inexperienced tourist, camera in hand, is likely to get the meaning of this behavior and seek the safety of a tree-top, or retreat. The signal in this case is strongly visual, but some of the posture and gesture signals are not so easily recognized by human observers. With the advance of methods and training in naturalistic field studies, more surprising facts are being discovered. For example, Dr. W. O. Pruitt, Jr., found that the mother Caribou (*Rangifer arcticus*) uses head-bobbing as a call-signal for the young fawn. This gesture releases the reaction of following in the newborn and may be given in various degrees of intensity. Dr. Francis Harper showed that in the Caribou the alert posture, with a hind leg extended backward, is a general warning signal to the rest of the herd.

We human beings are just beginning to know a little about the important message transmission by smell in the animal world. By nature we are poorly endowed for keeping up with smells and scents. Direct research methods are not yet well developed to study and trace olfactory communication in animals. But by watching and carefully observing the behavior patterns of the game animals, we have ample indirect evidence for the social importance of smell signals among them. Some olfactory messages are attached to marking posts, vegetation and earth-wallows of big game. In the rutting season these odor markings are a challenge and a threat to the rival males in elk and moose, but they also serve to orient and inform the females of the species. At other seasons of the year more subtle odor traces and tracks will help the mother elk to find and recognize her own calf, and to establish social bonds and even dominance relations in group or herd. There is also evidence that in some mammals — for example, in the wild hogs — temporary odor secretions, scaled in strength, can report various intensities of danger and emotional stress. If we attempt to establish a rank-order of importance among the message systems in the mammals, we find that the odor message will rank highest and most crucial in causing a response.

While the significance of smell tracks and traces in the insects has been recognized and studied for many years with great success, this whole branch of research is now receiving increasing attention in the mammalian forms. The study of these external body secretions, called "pheromones," promises some startling information on social dynamics in animal groups. In the meantime, I advise you to do a bit of your own observing and take a deeper, more sensitive look at the messages that are transmitted in the wild.

BOA CONSTRICTOR:

From Tropical Menace to Popular Pet

By HERNDON G. DOWLING

Curator of Reptiles

IT WAS NOT SO LONG AGO that travellers' tales, newspaper accounts and some of the more lurid movies combined to paint a picture of the Boa Constrictor (*Boa constrictor* Linnaeus) as one of the great dangers of tropical life. Dangling by its tail from an overhanging limb, it might pluck you from your horse as you rode down a jungle trail. Or it might creep stealthily into your tent some night and silently make away with one of your companions. It might even attack one of your horses and, upon being frightened away by your men, leave it a crushed and mangled sausage-shaped mass as evidence of the horrid meal it was about to make.

More information about animals in general and greater familiarity with the actual hazards of the tropics have dispelled most of these myths. Yet in the minds of the older generation, at least, the name "Boa Constrictor" is still closely allied (if not actually identical) with the huge pythons of Frank Buck movie fame.

Actually, of course, the true Boa Constrictor is not found in Africa or tropical Asia, but is restricted to the American tropics. Also, it is not really a "giant" snake. The longest Boa Constrictor ever reported was an eighteen-and-one-half-foot monster that was killed on Trinidad in the days of World War II and even this unusual individual was 18 inches short of the 20-foot length that Clifford Pope used as the definition of a "giant snake" in his recent book on these animals. Nevertheless, the Trinidad specimen was a legitimate "monster," for the more usual length of a really big Boa Constrictor is only about twelve feet.

Such animals are certainly no danger to human beings. They do, of course, kill other animals for their food, but these are likely to be in the size range of agoutis or rabbits in the case of large boas and mouse- or rat-sized in the case of smaller ones.

Trinidad still has plenty of Boa Constrictors and I acquired one along with an interesting history when I visited "Simla," the Zoological Society's Tropical Research Station in Trinidad in 1960. John Dunston, a fine local naturalist, is an old friend of the Station. In addition to his managerial duties at the nearby Arima cotton

Stephen Spencook has a three-part enclosure in his home for a pet boa, a myna bird and some frogs. Front is a storm window; the background a bright, wall-paper mural. Also built into the area: a hi-fi record player.

mill, he acts as a good-will mechanical expert and keeps the various items of household equipment in repair for the people who live near the mill.

It seems that one morning he received a telephone call from one of his neighbors saying that her electric clothes-dryer was not working properly. On quick inspection, he found that the hot-air fan was not operating, so he pulled the dryer away from the wall and removed the back plate. Inside was a five-foot Boa Constrictor wrapped around the fan – alive and in good health. Apparently the snake had crawled in through the air vent, found a warm and secluded place, and decided to stay. Mr. Dunston's varied talents stood him in good stead. Unwrapping the boa from the fan, he dropped it into a borrowed pillowcase, replaced the backplate, assured the lady that her dryer was "fixed," and carried away his bonus boa after suggesting that a grill be installed over the air vent.

New geography texts, television and the new age of air freight have all played a part in changing ideas of our younger generation about Boa Constrictors from those held by their parents. Whereas a few years ago a person would have to visit a large zoo or go to a circus to see a Boa Constrictor, now any herpetologically-minded child (or adult) finds it easy to have one of his own.

If the local pet store doesn't stock baby Boa Constrictors (and most of them do), there are numbers of mail-order dealers who are eager to serve. Nor are the costs prohibitive. At the local pet store a baby Boa may cost $5 or less. They may be even cheaper from mail-order dealers but the express charges (snakes may not be mailed in the United States) often exceed the base cost of the snake.

Thus, in these days many a young boy – and many a young girl and mature man too – has his own Boa Constrictor. Several hundred are sold each year in New York alone and, although no census has been taken, I am sure there must be literally thousands of pet boas in homes all over the United States.

This is not an unmitigated blessing for the boas, their owners, or the neighbors. Too often the snake is acquired without much thought of its needs as a living animal. A young herpetologist may buy it without parental knowledge or blessing, it may be housed in inadequate quarters, and too often it is given "care" of the most

casual, hit-or-miss kind. Such snakes live an unenviable and precarious existence. They are prime prospects for escape and are a burden to everyone concerned.

Here at the New York Zoological Park we get many calls from boa owners (we must average two or three telephone calls or letters a week on this subject alone) who have suddenly realized that they don't know how to care for their newly-purchased pet – or what is worse, have waited until the boa is *in extremis* before calling to find out what to do. This is one area where a little knowledge makes a big difference in results.

Actually a Boa Constrictor's requirements are very simple: cleanliness, warmth, food and water. Unfortunately, too many people do not think to get the consent of their associates, provide an adequate enclosure and line up a regular supply of food (mice) *before* obtaining their pet.

The enclosure can be a regular aquarium but it must have a special snake-proof top. Metal-rimmed hardware-cloth (⅛- or ¼-inch mesh), if *tightly fitted* (all snakes are outstanding escape-artists) makes a good top. Better still is a glass-fronted enclosure with some provision for ventilation. A method of locking the enclosure helps to provide for the safety of its contents and the indulgence of the neighbors.

The enclosure should be kept clean, dry and warm. A common aquarium thermostat connected to a light bulb or a small heater may be necessary for the warmth. A sheet of newspaper folded to fit the bottom of the enclosure aids in keeping it clean and a water dish of a shape that is not too easy to turn over is a help in keeping it dry. If the enclosure is about the length of your Boa Constrictor when you obtain it, it will still be adequate when the boa has grown to twice its original length.

And this may not take as long as you think. Forty-eight babies were born to a Boa Constrictor in the Reptile House on April 28, 1964. We have kept records of the growth of ten being kept by different people under different conditions. All the babies were within an inch of 21 inches long when they were born (52-55 mm.) and weighed about two and one-half ounces (74-78 grams). Ten months later the biggest one was 40 inches long and had increased its weight ten times (780 grams).

The boas began by eating freshly-killed half-grown mice – one a week. They soon "graduated" to full-grown mice, first one then two per week. At the end of 1964 the largest individual was taking three full-grown mice every seven or eight days and was about ready to graduate to small rats. The expectation is that these boas will continue to grow rapidly for about five years and will then slow down. Stephen Spencook, the Head Keeper of the Reptile House, has a pet Boa that was just over eight feet long at the age of eight years.

His boa admirably demonstrates the necessity of a warm enclosure and the *lack* of necessity of sunlight for these nocturnal reptiles. This pet Boa has been kept in an unlighted box with just a few airholes for more than six years. It has never seen sunlight, except perhaps accidentally, and has been essentially in the dark for this period. Yet it is one of the healthiest and best-looking Boa Constrictors I have ever seen. It has a good disposition and a beautiful irridescent sheen to its scales – a sign of good health.

The box is kept against a radiator and maintains a temperature of 80 to 85 degrees most of the time and occasionally goes to 90 or 95 degrees. This seems to be ideal for the Boa Constrictor. Although a night-time temperature in the low seventies does not seem to hurt them, they apparently need the mid-eighty temperature most of the time.

Why do people keep Boa Constrictors? Even the healthiest and most alert Boa, though it may seem to appreciate petting, is nothing like as responsive as a dog. Part of it, of course, is that they are "different." Some owners explain it also in terms of convenience.

Boas don't have to be "walked," they don't whine to be let out, they don't bark and disturb the neighbors. If the owners go away for a couple of weeks, they don't need a "snake-sitter," A well-filled bowl of water is sufficient. A couple of weeks without food, or even a couple of months, is far from "starvation" to a healthy boa. In nature they eat extremely irregularly and often "pause" for much longer periods than that.

One thing is certain: a child growing up with a boa is unlikely to be frightened by "snake-stories" later in life. And other owners have other reasons. Boa Constrictors, anyone?

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

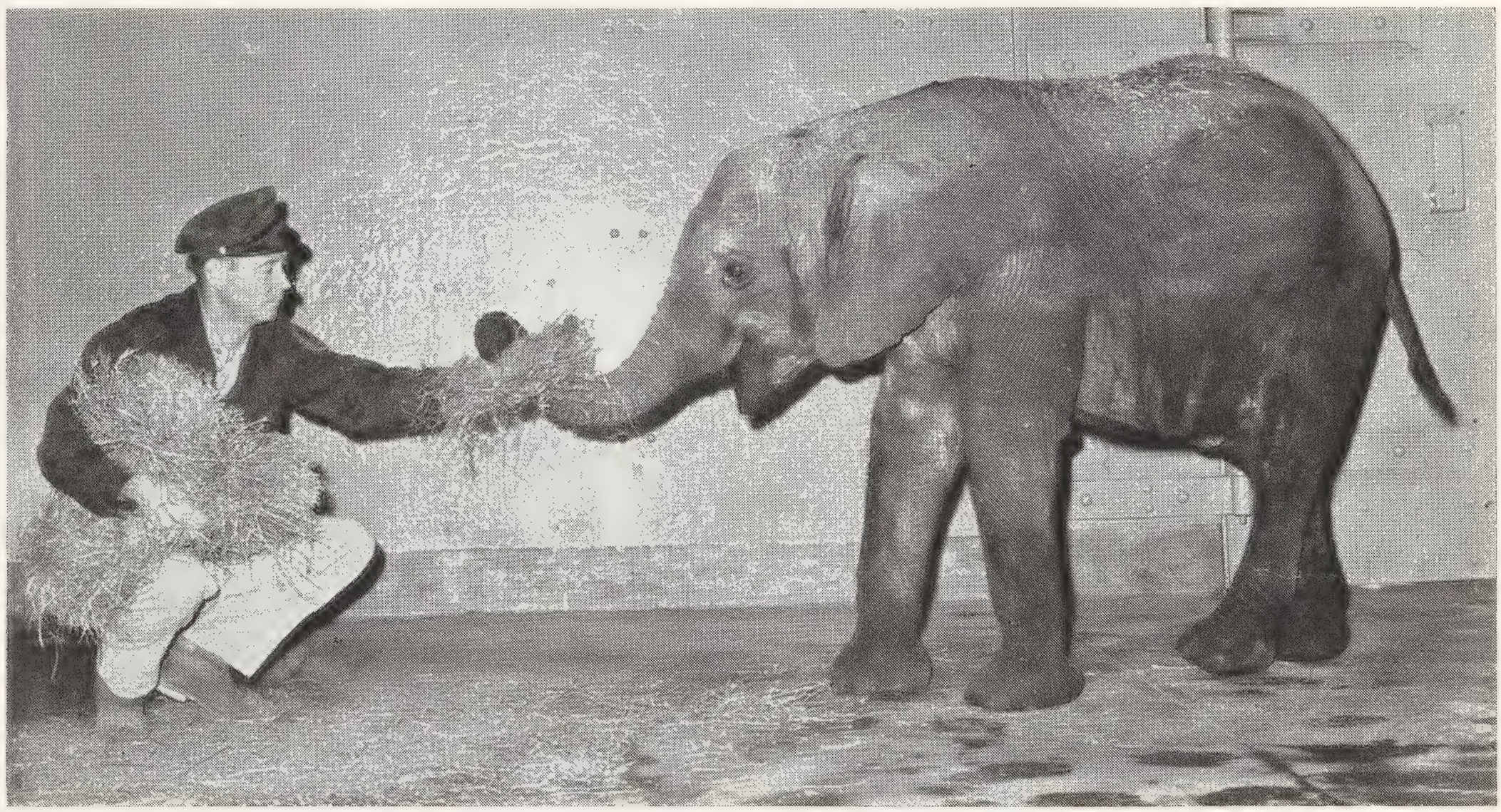
Dacca's Cub Maintains Tradition; 33 Offspring Surpass Mother

Following the death last year of "Dacca," our prolific and zoo-famous Bengal Tiger, who between 1948 and 1959 presented us with 32 cubs, we made inquiries of the zoos to which her offspring had been sent, to check on their progress and possible breeding results. Not all the 20 zoos replied and some had to confess to inadequate records, so that we do not have a complete history of the progeny. However, the most outstanding and gratifying result of our survey was receipt of information from the Lincoln Park Zoo in Chicago. On May 15, 1952, we sent them a female cub of a litter of four that had been born here the previous year. She was Dacca's 12th cub and had been named "Bara," the Indian word for that number. Maintaining family tradition, Bara has mothered 33 cubs—one better than Dacca—in 15 litters while paired with "Pieter," a Sumatran Tiger. Cubs number 32 and 33 were born at the end of October, according to word from Lincoln Park.

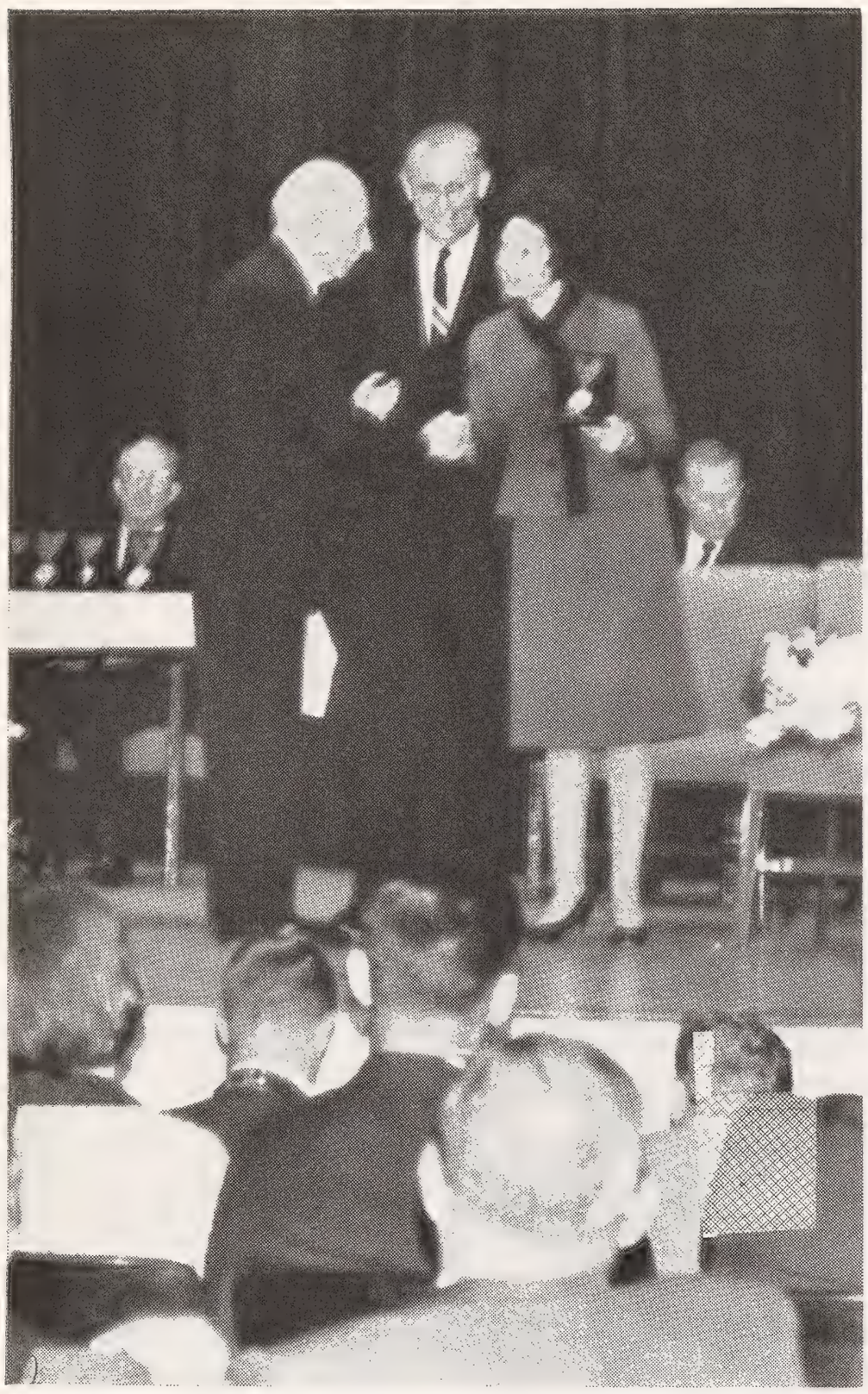
GRACE DAVALL

Our Gerenuk to San Diego Zoo in Breeding Transfer

On the morning of Wednesday, November 3, we sent our only Gerenuk, a female, to the San Diego Zoo, which has only one member of the species, a male. The female was born here on September 30, 1963, the first and only Gerenuk born in an American zoo. (The Frankfort Zoo in Germany had previously bred Gerenuks). Subsequently, both the father and the mother died, leaving only the baby.



Keeper John Curran gets acquainted with "Toto," our new African Bush Elephant purchased from a Nairobi dealer. The 3-year-old female weighs half a ton and adores oranges.



Mrs. Lyndon Johnson presents Lee S. Crandall with the Gold Medal of the American Institute of Park Executives in Milwaukee. Also pictured is Frank Vaydik, Institute president.

The reason for sending our female to San Diego was explained by Director Conway this way:

"In a climate of vanishing wild lands and wild creatures, each zoo finds its captive collection increasingly precious and all must strive to cooperate in the preservation of rare animals by bringing unmated specimens together."

Because of the Gerenuk's nervous nature, veteran Mammal Keeper Neil Dapolite accompanied the animal on the flight from Kennedy Airport to Los Angeles and by truck to San Diego.

Lee S. Crandall Receives Everly Gold Medal

Lee S. Crandall, General Curator Emeritus of the Zoological Park, was given the Everly Gold Medal Award of the American Institute of Park Executives on September 21 at the annual conference of the Institute in Milwaukee. The award was made by Mrs. Lyndon B. Johnson.

The citation accompanying the award said: "Highly respected by his colleagues throughout the world, Lee S. Crandall has written more than 300 papers during his long and active career and is considered a major contributor to the general and specific knowledge of the zoological park field. In 1964 he published a monumental work, *The Management of Wild Mammals in Captivity*. The first book of this nature to be written, it will stand as a classic in its field."

The Everly Gold Medal Award was established in 1964 and was made possible through a trust agreement by Robert E. and Beatrice Everly of Glencoe, Illinois. Conrad L. Wirth, former Director of the National Park Service, also received an Everly Gold Medal Award at the Milwaukee conference.

Election and Awards at AAZPA Meeting

Director William G. Conway of the Zoological Park is president-elect of the American Association of Zoological Parks and Aquariums following the annual conference of the Association in Milwaukee in September. He will take office next year.

The Edward H. Bean Memorial Award for breeding of rare mammals went to the New York Zoological Park for its success with Small Malayan Mouse Deer, *Tragulus javanicus*. Our herd now numbers 18 and extends over four generations since the arrival of our first pair in 1961.

Zoo's First Striped Possum and Other Mammal Events

A number of interesting and unusual additions have come to the Zoo's mammal collection, including a Striped Possum (*Dactylopsila trivirgata*), four Gray Wolves (*Canis lupus*), four Flying Foxes or Indian Fruit Bats (*Pteropus giganteus*), two Celebes Crested Apes (*Cynopithecus niger*) and two False Vampire Bats (*Vampyrum spectrum*).

Less than 24 hours after we received a pair of False Vampire Bats from Trinidad the female gave birth. Baby's head and ears are visible (left) below mother's wing membrane.

Within a day after her arrival by airplane from Trinidad, the female False Vampire gave birth, giving us three of the species.

A juvenile African Bush Elephant is a new addition to the Elephant House, coming to us through an animal dealer in Kenya. The 1,006-pound youngster, about three years of age, was named "Toto," Swahili for "baby."

Besides the Flying Foxes, our first in 37 years, the Small Mammal House also has on display probably the first Striped Possum shown in the United States. The small creature was a gift from Dr. Jared Diamond, a Brookline, Massachusetts, ornithologist, who had it as a house pet in New Guinea.

The wolves had been the house pets of a St. Louis family until neighbors objected (LIFE Magazine, Oct. 8), whereupon the animals were sent to the Bronx Zoo. They have been installed in the old Bear Dens temporarily until a new Wolf Wood area is ready for them in the spring. Construction is already well advanced and will continue through the winter.

One of the most noteworthy recent births at the Zoo occurred in the Monkey House on October 30, when a baby was born to one of the Talapoin Monkeys (*Cercopithecus talapoin*).

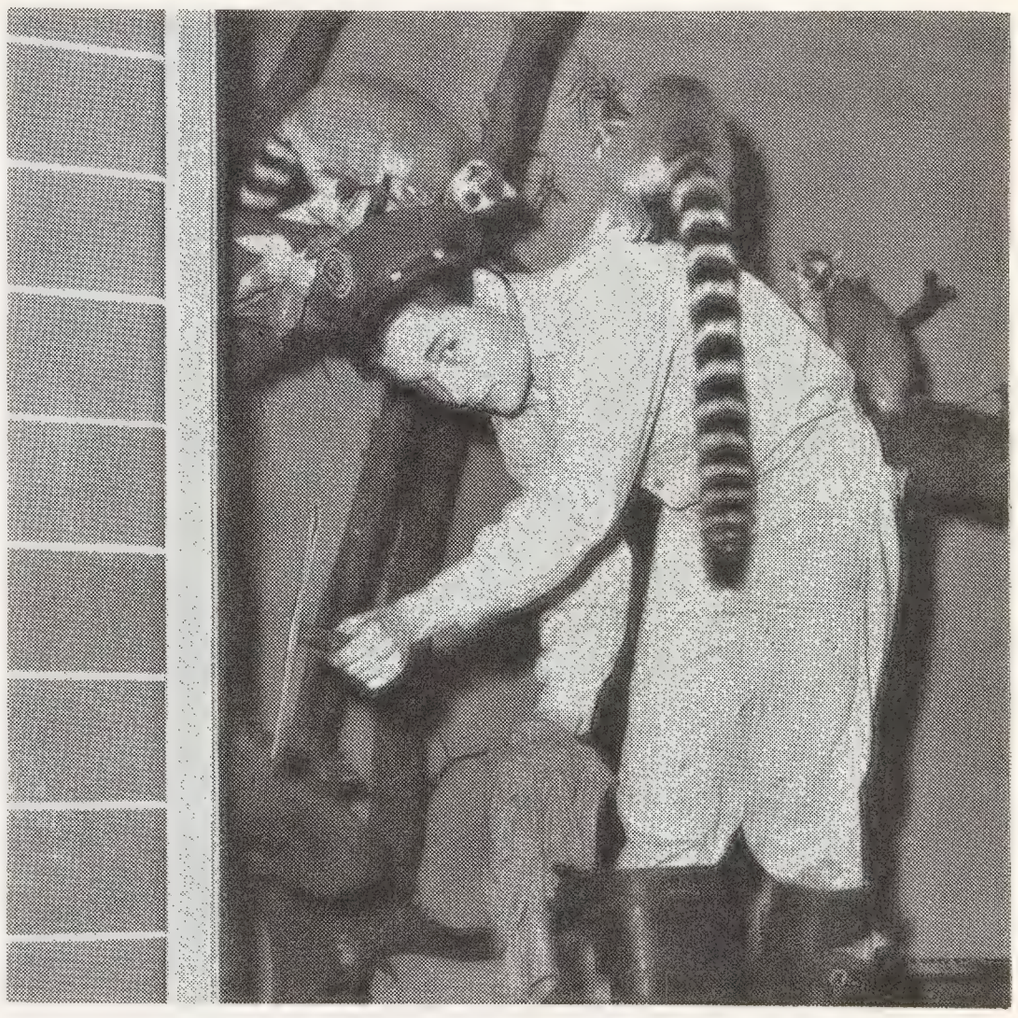
Correction

The name of Dr. Carleton Ray, Curator of the Aquarium, was inadvertently omitted from the authorship of "The Weddell Seal at Home (Part 2)" in the September-October issue of *Animal Kingdom*. Co-authorship should have been ascribed to William E. Schevill, Woods Hole Oceanographic Institution, and Carleton Ray, New York Aquarium.

IN BRIEF

Pygmy Hippo Baby. For the third time in five years, our Pygmy Hippopotamus pair, Hugo and Henrietta, have produced an offspring. Once again it was a daughter, Caroline, who weighed seven pounds and measured 17 inches in length and 10 inches in height. Caroline was introduced to the public on her very first day, October 27, via NBC News, who sent a reporter and camera crew up to the Park for pictures of the baby and an interview with Assistant Mammal Curator Brad House.

Society Fellow to Lecture. Dr. Richard Van Gelder, a newly elected Fellow of the Zoological Society, who began his career as a summer keeper at the Bronx Zoo and is now Chairman and



When Assistant Keeper Robert Holland goes in to clean Ring-tailed Lemur enclosure at the Monkey House, the unusually tame animals, two males and two females, climb over him.

Associate Curator in the Department of Mammalogy at the American Museum of Natural History, will present a series of 10 Wednesday evening lectures at the American Museum beginning in early February. The lectures on the biology of mammals will be open to members of the Zoological Society.

PUBLICATIONS OF INTEREST

PRACTICE OF WILDLIFE CONSERVATION. By Leonard W. Wing, 412 pp., photographs. John Wiley & Sons, New York, 1965. Paperback, $2.65.

This book was first published in 1951 as a textbook of wildlife conservation and management. It discusses basic principles as well as practices, and today's students will find it as useful as it was 25 years ago.

THE SENSE OF WONDER. By Rachel Carson. 96 pp., photographs in black-and-white and color by Charles Pratt and others. Harper & Row, New York, 1965. $4.95 through 1965; afterward, $5.95.

This is Rachel Carson's last book, which she was unable to expand before her death in 1964. It is dedicated to her young nephew, to whom she seems to have transmitted her own vivid sense of wonder about the things of the natural world. The writing is as simple and sensitive as anything she wrote, and the photographs are worthy of the text. Children whose parents read and ponder "The Sense of Wonder" are to be envied.

THE COMPLETE PUPPY & DOG BOOK. By Norman H. Johnson, D.V.M., in collaboration with Saul Galin. 494 pp., photographs. Atheneum, New York, 1965. $7.95.

"The Complete Puppy & Dog Book" is a good general reference volume for the pet owner. A wide variety of material is covered, for the most part extremely well. The second chapter is devoted to the different breed characteristics and though one must allow certain minor discrepancies in such a compilation, this section has many questionable and inaccurate statements.

Mention of American Kennel Club approved kennels for purchasing dogs is misleading, as the AKC does not formally approve any kennels, breeders, etc. The value of this book lies in its broad coverage of almost everything to do with pet dogs. Doubtless dyed-in-the-wool pure-bred dog lovers will want more specific and intensive material, but this does not detract from its over-all value to the pet dog owner.

—Charles P. Gandal

A NEW DICTIONARY OF BIRDS. Covering the birds of the world. Edited by A. Landsborough Thomson. 928 pp., 17 col. pls., many photographs, 300 + line drawing. McGraw-Hill Book Co., New York. $17.50.

If there was ever a book every ornithologist, professional or amateur, should have, this is it. Alphabetically arranged and international in scope its entries begin (with "ABDOMEN") and end anatomically (with "ZYGOMATIC ARCH") but in between they cover amost every imaginable avian subject from eggs to feathers, from speciation to statistical significance and even from tameness to taste. Competent articles by a who's who of contemporary ornithologists, mostly British, deal with general subjects, with bird families and even offer English and American names for many forms in non-English language areas. In fact, the full use of English names throughout the book is one of its most attractive features for amateurs.

Naturally, the "New Dictionary" is adequately cross-referenced but surprisingly, in a work of this size, it is concisely and clearly writen. Its photographs are well chosen and the color plates in my copy are competently executed. The fine illustrations and straightforward prose constitute a distinct contrast to Alfred Newton's more leisurely 1896 "A Dictionary of Birds."

Not very much useful criticism is likely to be leveled at the "New Dictionary" but some groups and subjects are treated less fully than others. Unfortunately, several important family resumes, parrots and pelicans for example, offer no bibliographies, although others such as that on penguins, are remarkably comprehensive. Plate 12, labelled Common Crow, a photograph by Allan Cruickshank, is probably a Fish-Crow, but this "nit-picking" cannot obscure the tremendous value of the work to anyone who wishes to brush up on the world's bird life. More than 230 general subjects are treated, countless terms defined and every avian family reviewed.

The "New Dictionary" was designed as a centenary publication of the British Ornithologist Union. While old Newton's eloquence is gone, along with other decorative appurtenances of a more graceful era, surely he would be pleased with this successor to his Dictionary and astounded at the growth and complexity of modern ornithology. — W. G. Conway

BIRD MIGRATION. The Biology and Physics of Orientation Behavior. By Donald R. Griffin. xv + 180 pp., Line drawings. Doubleday & Company, Garden City, 1964. Paperback, Anchor Books Science Study Series, $1.25.

This book, by the head of the newly-created Zoological Society-Rockefeller University Institute for the Study of Animal Behavior, is the best résumé of current knowledge and speculation about bird migration behavior. Dr. Griffin, formerly Professor of Zoology at Harvard University, has added another clear and engagingly-written volume to his works, which include "Listening in the Dark" and "Echoes of Bats and Men."

Anyone who has paused to wonder how birds find their way from wintering grounds to breeding territories thousands of miles away will find this a thoroughly readable but completely scientific feast. Bit by bit, Dr. Griffin unfolds the story and excitement of the still incomplete scientific investigation of bird navigation. His own participation in this investigation has led not only to the creation of esoteric scientific contributions but also to the fledging of a scientist-pilot capable of stalking birds and recording their behavior in their own element. — W. G. Conway

OUR NATURAL WORLD. Compiled and edited with comments by Hal Borland. Drawings by Rachel S. Horne. 849 pp. Doubleday & Co., New York, 1965. $9.95.

Subtitled "The land and wildlife of America as seen and described by writers since the country's discovery," this is an anthology of long extracts from approximately ninety well-known and not-so-well-known writers. They are grouped under headings of The Woodlands, The Watery Places, The Plains and Deserts, The Mountains, Animals, Birds, Insects, Plants and Trees, and to each section Mr. Borland has written a preface, with brief biographical notes on each author. Mr. Borland is the naturalist who writes the "outdoors" editorial for the *New York Times* each Sunday and he knows how to choose wisely for such an anthology as this.

New Members of the New York Zoological Society

(Between September 1 and October 31, 1965)

Fellow

Dr. John M. Budinger
Dr. Richard Van Gelder

Life

David J. Hoffman

Supporting

W. Gurnee Dyer
Richard C. Pistell
Dr. John J. Scott
Lawrence A. Wien

Contributing

Mrs. DeWitt Alexandre
Peter A. Bator
Mrs. Joan H. Brenno
Mrs. William J. C. Carlin
James P. Casey
Dr. Larry James Chaitovitz
Mrs. Robert S. Conant
Charles Henry Coster
Mrs. William W. Crawford
Mrs. Felix de Narvaez
Frank Di Francesco
Mrs. Samuel G. Dunham
Mrs. Cornelius C. Felton
Miss Betty A. Hagerman
William T. Haldt
George D. Hawthorne
Mrs. DeWitt Hornor
Richard F. Hunnewell
Mrs. Rhea B. Jezer
Mrs. Alexander D. Knox
Milton Krasner
Frank Landrey
Mrs. James Laughlin
Mrs. James B. Liberman
Mrs. Alexander D. Mallace
Henry G. Miller
Mrs. Leonore O. Miller
Dr. J. George Moore
James W. O'Neil, Jr.
Commander Marsden J. Perry
Dr. Richard Rashbaum
Miss Catharine Raymond
Mrs. John W. Richmond
Miss Helen R. Roberts
Mrs. John R. Shattuck
Mrs. Sidney Singer
Conrad L. Wirth

Annual

Fred A. Allis
Dr. Fernando Asencio
Harry W. Asher, Jr.
Eugene D. Balsley
Dr. Seymour Baron
Dr. Bruce A. Barron
Guilford H. Bartlett, Jr.
Miss Aileen Beaufort
Ernest Bencivenga
Miss Beverly Bender
James A. Beresford
Michael R. Beresford
Peter M. Berkery
Mrs. Barbara Bernard
Dr. Murray Bilmes
Dr. Richard S. Blacher
Dr. Sherman Bloom
Robert H. Blucher
Alfred Bornemann
Mrs. B. S. Bottome
Mrs. Robert E. Boyd
Mrs. Stanford H. Brainerd
Stanford F. Brent
Mrs. Barrett Brown
Dr. J. Robert Buchanan
Mrs. Lawrence C. Burman
Miss Virginia Burton
Mrs. Clarence F. Busch
Scott Cameron
Mrs. William M. Canby
Professor Grace M. Carhart
Mrs. Eleanor Cavanagh
Robert A. Charpie
Mrs. Stephen Y. Chin
Miss Theodora Christon
Dr. L. W. Clausen
Mrs. Ethel L. Clevans
Mrs. Anthony B. Cleveland
Mrs. Arthur O. Coco
Mrs. Arthur J. Cohen
Dr. Donald Cohen
Ronald Conti
Miss Lyn Cortlandt
John Lyman Cox, II
H. Page Cross
Mrs. Joan Dane
Mrs. Thorne Dempsey
Miss Mary Rose Di Gaudio
Miss Sophia Duckworth
Dr. John L. Duffy
Miss Patricia Duggan
Miss Jode Durie
David A. Dushkin
John Everett Dwight
Mrs. Shirley F. Ebinger
Mrs. Albert Edelman
Dr. Richard G. Ehrman
Mrs. Carol Epstein
Sherman Ewing
Dr. Elaine B. Feldman
Carl Ferenbach
Miss Elizabeth Fisher
Mrs. Nora Fisher
William Forster, Jr.
Mrs. Alice Green Fredman
Mrs. John W. Frost
Mrs. Lee M. Fuller, Jr.
Miss Dianne Gallagher
Carl T. Gerdes
Philip E. German
Dr. Richard K. Gershon
Mrs. Carl A. Gherardi
Dr. Warren Glaser
Mrs. A. Glassgold
Arnold H. Goldstein
Sidney Goldstein
Mrs. Laurence I. Goodman
Miss Elizabeth Gordon
Mrs. Jack A. Gorelick
Mrs. Sascha Gorodnitzki
Mrs. Jean R. Graef
Dr. Pauline Gratz
Dr. David B. Greene
Dr. Jerome Greenholz
Miss Virginia Scott Greenway
Ephraim Gunsberg
Harold W. Haedrich
Mrs. Helen C. Hargrove
Fletcher M. Harper
Mrs. Colette B. Harrison
Miss Emily Harste
Victor Louis Hart
Miss Karen Hauser
Mrs. Joan Haywood
Harold J. Heitmann
Dr. Philip E. Henig
Richard Herzig
Mrs. Rebecca Hirshleifer
Mrs. Dian R. Hitchcock
Mrs. Norman L. Hope
Mrs. Martin Horner
Matthew Benjamin Horween
Dr. Peter B. Hukill
Mrs. Stephen Hurlbut
Mrs. Robert V. P. Hutter
Miss Hope Clay Igleheart
Mrs. Jed Hotchkiss Irvine
Dr. Julius H. Jacobson, II
Gian Chand Jain
Dr. Saul Jarcho
Miss Frances Jay
Miss Esther H. Jefferis
Mrs. John E. Karlin
R. Katz-Braunschweig
Mrs. Edna M. Kaula
Donald M. Kent
Mrs. Nancy L. Kessner
Harold J. Kihl
Mrs. Stanley B. Kirk
Dr. Francis M. Kivlahan
Dr. Anthony Kohn
Arthur Kramer
Miss Katherine V. Kreidel
Sid Laufer
Miss Ethel W. Leary
Matthew G. Leeds
Mrs. Martin Levene
Mrs. Kenneth D. Levin
Miss Marion H. Lewis
Robert J. Light
Mrs. Robert F. Link
Mrs. Edmund T. Lonergan
William B. Long
Dr. Rhoda L. Lorand
Mrs. Donald G. Luck
Col. Henri A. Luebbermann
Miss Dorothy P. McAlpin
Dr. James A. McA'Nulty
Mrs. Caroline R. Madison
Dr. Harry Madissoo
Dr. Cecil Marquez
H. Benthall Marshall
H. Benthall Marshall, Jr.
Philip Mayer
William Medway
Richard G. Merrill
Dr. John A. Moody
Mrs. David E. Moore
C. Frank Naumburg
Andre W. G. Newburg
David H. Nichols
John Nichols, Jr.
Ralph H. Niemann
Mrs. Samuel Noble
Mrs. Richard R. Ohrstrom
Miss Helen E. Osburg
Miss Matilda Ouziel
Norman H. Parsons
Herman M. Patterson
Dr. Luis Manuel Penalver
Raphael Z. Perlman
Mrs. Beatrice G. Perlmutter
Bernard Alan Peskin
Dr. T. V. Peters
Arnold Pomerantz
Donald Paul Pomeranz
Sherman Pops
Dr. Stanley R. Radel
F. Leslie Raynor
Alfred S. Reger
Dr. H. Christine Reilly
Mrs. Alfred E. Riccardo
Dr. J. Beall Rodgers
William Rosenblitt
Isidore A. Rothstein
Daniel S. Ruchkin
Dr. William L. Rumsey
Mrs. Susan Y. Sachs
Dr. Harold H. Sage
Alan Savitsky
Miss Hope Sayles
Peter Schaaf
Dr. Fenton Schaffner
Dr. Myron R. Schoenfeld
Dr. Murray Schwartz
Dr. Albert Shansky
Jerome G. Shapiro
Gerald E. Silberg
Mrs. Margarita Silva-Hutner
Dr. Burton S. Sklarin
Mrs. Dudley C. Smith, Jr.
Theodore Smith
Mrs. Adela M. Sobrero
Mrs. Ruth C. Spiro
Mrs. Henry Sprungli
Mrs. James W. Sterrett
David Stocker
Dr. Joel M. Stutman
Mrs. T. F. Tartaglia
Mrs. Maria D. Thompson
Henry Tilp
Rev. Eson Tse
Lawrence Tudda
Michael F. Waters
Edward I. Weinroth
Dr. George J. Witkin
Dr. Herbert Wohl
Dr. William I. Wolff
Miss Dorathea A. Wolgast
Dr. Robert G. Wolk
Frank D. Yablonsky
Mrs. Joseph M. Young

INDEX

Figures in **black type** indicate that the reference is to, or includes, an illustration, map or design.

A

Africa West, opened, 159
Agkistrodon, 76
Alligator, American, **75,** 76
  Chinese, 76
  sinensis, 56
  Yangtze, **50,** 56
Atmann, Margaret, "Messages in the Wild," 179
  observing wildlife, **179**
American Institute of Park Executives, award of, 187
"Andy," Orang-utan, **126**
Angwantibo, **132**
Anteater, Giant, in Animal Nursery, **81**
  Silky, long lived, 133
Apes, Great, reaction to TV, 30
  Crested Celebes, at Zoo, 187
Aquatic Birds Building, bamboo moved to, 95
  color pictures of, **175-178**
Arctogalidia trivirgata, 133
Argentina, expedition to, 2, 40, 115
  wildlife of, 134-140

B

Barba amarilla, **20**
Barranquero, Lesser Patagonian Parakeet, 40, **44, 45**
Bassariscus, 104
Bat, False Vampire, 187, **188**
  Indian Fruit, 187
Bateman, Robert, animal gifts from, 132
Bear, Polar, in Zoo, **16**
Beaver, Mountain, in Zoo, 133
Bellbird, Mossy-throated, **49**
Beluga, companions for, 157
"Bendera," gorilla baby, **98, 103**
Bergel, Sylvia C., "It's Easy to Take Good Photos of Animals in the Zoo!", 109
Bittern, Sun, **Cover No. 5**
  nesting, **111,** 159
Blakely, Ron, 146
Blesbok, in Zoo, **127**

Brandwein, Paul F., 91
Bridges, William, "They Learned About Animals by Work and Research," 141
Boa constrictor, **183, 184**
Books Reviewed:
"The World of the Raccoon," 31
"The Land and Wildlife of North America", 31
"Rare and Exotic Birds," 31
"The Sign of the Flying Goose," 32
"Bumble: Pig in Paradise," 32
"African Wildlife," 63
"The Run," 63
"Wild Heritage," 63
"You, Me and the Animal World," 63
"Animals as Social Beings," 63
"How to Use a Microscope," 63
"Reptiles and Amphibians," 63
"The Woods and the Sea," 63
"Lion Island," 63
"The World of the Tiger," 95
"The Enormous Zoo," 96
"Budongo," 96
"Meet the Southwest Deserts," 96
"Journey to the Jade Sea," 96
"All About Elephants," 96
"The Primates," 96
"Charles Darwin," 96
"The Seal Summer," 96
"Wild Animals in Captivity," 96
"The Puma," 96
"The Wolves of North America," 96
"Early Man," 127
"Europe," 127
"The Bird Watcher's America," 127
"The Wreck of the Whaleship Essex," 127
"Shelling the Sea of Cortez," 127
"The Animal Kingdom," 127
"Caterpillars and How They Live," 159
"North American Bird Eggs," 159
"A Guide to the Natural World," 160
"Bird Display and Behavior," 160
"Almost Human," 160
"Animals and Men," 160
"Practice of Wildlife Conservation," 189
"The Sense of Wonder," 189
"The Complete Puppy & Dog Book," 189
"A New Dictionary of Birds," 189
"Bird Migration," 189
"Our Natural World," 189
Bothrops atrox, 18, **20**
caribbaeus, **20**
jararaca, **20**
lanceolatus, **20**
Budorcas taxicolor bedfordi, 56
taxicolor taxicolor, 56
Bushbaby, Demidoff's at Zoo, 132, **133**
Buss, Irven, 33

C

Caluromysiops irrupta, 131
Camel, Bactrian, Peking, Zoo, 56
Canton Zoo, rebuilding of, 50-52
Capreolus c. bedfordi, 52
Capricornis sumatraensis milneedwardsi, 56
Caracara, 43
Caribou, communication by, 182
Carnis lupus, at Zoo, 187
Cassowary, Violet-necked, **110**
Cat, Golden, Peking Zoo, 55
Leopard, Peking Zoo, 55
Pallas, Peking Zoo, 55
Cavy, Patagonian, 45
Centetes ecaudatus, 133
Cephalophus maxwellii, 159
monticola, 159
Cercopithecus talapoin, **48**
born at Zoo, 188
received, 30
Cervus albirostris, 56
elaphus xanthopygus, 52
unicolor equinus, 56
"Champion Zoologist," school exhibit, 95
Channel 13, party at Zoo, 31
Chapman, Paul M., makes collections, 62
Chevrotain, Small Malayan, at Zoo, 133
Chimango, 43
China, zoological rarities of, 50-56
Chironectes minimus, **131**
Clarke, Pat, **81**
Coates, Christopher W., retires, 29
Cobra, King, babies, 95
eggs laid by, 126
Coligruezo, **130**
Collister, William, **158**
Communication, animal, 179
Conservation Foundation, Airlie House meeting, 91
American Film Festival, 91
Environmental Science Series, 28
Habitats Conference, 28
moves to Washington, 129
Constrictor, Boa, as pet, **183, 184**
Conway, William G., **157**
"A Close Look at Argentine Wildlife," 134
"Apartment-building and Cliff-dwelling Parrots," 40
"Counting Elephant Seals on Punta Norte," 2
president-elect of A.A.Z.P.A., 187
re-elected to Propagation Trust, 95
"The Penguin Metropolis of Punta Tombo," 115
Cordier, Charles, 61
Cornell University, summer research program, 94
students at Zoo, **141, 142**
Courser, Black-backed, 156
Crandall, Lee S., book reprinted, 159
receives gold medal, **187**
Crane, Asiatic White, Canton Zoo, 52
Black-necked, 52, 53
Hooded, 53
Manchurian, **50, 52,** 53
White-naped, 52
Crane, Jocelyn, report by, 93
"We All Ritualize Our Behavior Sometimes," 155
work on Fiddler Crab, 33
Crocodile, Nile, 74
Salt-water, growth of, 74
Slender-snouted, growth of, 74
Crocodile Bird, 156
Crocodilians, feeding at Reptile House, **78**
Cryptobranchidae, 76
Curran, John, feeding elephant, **186**
Cyanoliseus p. patagonus, 40
Cynopithecus niger, at Zoo, 187

D

"Dacca," offspring of, 186
Dactylopsia trivirgata, first at Zoo, 187
Dapolite, Neil, Keeper, 187
Darling, Frank, 91
Davall, Grace, **157**
Davis, Joseph A., Jr., **57**
"It's a Great Year for Rarities," 130
review of "Mammals of the World," 13
"The Fine Art of 'Greeting' Tigers," 57
Deer, Manchurian Roe, Canton Zoo, 52
Manchurian Sika, Peking Zoo, 56
Père David, fawn, **80,** 142
Small Malayan Mouse, rare animal breeding award, 187
White-lipped, Peking Zoo, 56
Department of Behavioral Sciences, 1
Diamond, Dr. Jared, gift to Zoo, 188
Discovery Bay, temporary field station at, 62
Dowling, Herndon G., academic appointments of, 95
"A Tangle of Serpents," 18
"Boa Constrictor: from Tropical Menace to Popular Pet," 183
"Our Crocodilians Like it Hot," 74
Driscoll, Charles, attends seminar, 92
Drury, William H., 3, **41,** 42, 115, 134, **135**
Duck, Mallard, **79**
Duiker, Blue, at Africa West, 159
Maxwell's, 159
Dunton, Sam, photographs by, **15-17, 47-49, 79-81, 143-145**

E

Echinops telfairi, 133
Education Department, natural history awards, 93
Eichhorn, Noel, attends meeting, 92
Eisenberg, Dr. John, 133
Elephant, African Bush, new at Zoo, **186,** 188
in Ruaha National Park, 29
mouth of, **113**
Elk, attitudes in wild, **180, 181**
Elm tree, injected at Zoo, **92**
Emsley, Michael, named Assistant Director D.T.R., 29
Equus homionus kiang, **56**

F

Felis bengalensis, 55
manul, 55
temmincki, 55
Fer-de-lance, 18, **20**
Fleay, David, "Australia's Little 'Needle-in-the-Haystack' Marsupial," 162
Fox, Flying, at Zoo, 187
Patagonian, **136**
Fratercula arctica, 82
Frazier, John G., Cornell student at Zoo, **141,** 142

G

Galago, Demidoff's, **61**
Gandal, Charles P., **101**
"Four Baby Gorillas — Four Personalities," 98
skunk operation, 158
Gander, Frank F., **105**
"Spotted Skunks Make Interesting Pets," 104
Gerenuk, sent to San Diego Zoo, 186
German Shepherd, dogs patrol Zoo, **158**
Gilboa, Itzchak, 63
Gimbel, Peter R., 35
Giraffe, Reticulated, Canton Zoo, 51
Goelet, Robert G., 3, **9, 41,** 115, **123,** 134
Goose, Abyssinian Blue-winged, **111**
Lesser Magellan, to Ostrich House, 62
Gorilla, Lowland, babies, **98-103, 142**
Goreau, Dr. Thomas, "Coral Reef Project," 62
Gould, Dr. Edwin, 133
Gourami, Kissing, **Cover No. 6**
Graham, Dr. Edward H., 91
Greenstone, Matthew H., Cornell student at Zoo, **142**
Gregg, Frank, 91
Griffin, Donald R., 33, 93
Grouper, Red, at Aquarium, **93**
Grus japonensis, 52
lencogeranus, 53
monachus, 53
nigricollis, 52
vipio, 52
Gull, Black-backed, 115, **136-137**
Dolphin, **138,** 139, 140
Guanaco, **134-135,** 136
Guanay, 140

H

Haematopus ater, 139
Hammerhead, Greater, at Zoo, **47**
Heck, Dr. Heinz, 78
Hedgehog-tenrec, Large, at Zoo, 133
Small, at Zoo, 133
Heron, Indian Gray, **16**
at Aquatic Birds Building, **62, 113**
Hippopotamus, Pygmy, baby born at Zoo, 188
Hirt, Arthur, **92**
Holland, Robert, **188**
House, Brad, appointed, 60
television interview, 188
Howe, Sidney, 91

I

Iguana, Green, 148
iguana, 148
Marine, 146, **147,** 148-150

J

Jaguar, Peking Zoo, 55
Jararaca, **20**
Jensen, Paul R., Cornell student at Zoo, **142**
John A. Hartford Foundation, grant by, 62
Johnson, Mrs. Lyndon B., **187**
Jerry, designs "Seal Island," 174
Prairie Dog display, 159
Jolly, Alison, 33
Jungblut, Robert, **92**

K

Kern, James A., **68**
"The Proboscis Monkey," 67
Kiang, Peking Zoo, **56**
Kite, Everglade, 43
Knobloch, Herbert J., **157**
named Curator of Education, 29
"Koga," gorilla baby, **98, 101, 103**

L

Laboratory of Marine Sciences, 1, 97
Langurs, Golden or Snub-nosed, Shanghai Zoo, **51,** 52
White-headed, **51**
Larus marinus dominicanus, 137
Lavalee, Lt. David O., U. S. Navy, 35, **36**
Lemur, Ring-tailed, **188**
Leopard, Black and Spotted, Peking Zoo, 55
Clouded, in Lion House, 62
North China, 52, 55
Snow, Peking Zoo, 55
Leptonychotes weddelli, 36, 62
Leucophaeus scoresbii, 139

Lion, **112**
Peking Zoo, 55
Lizard, Scalyfoot, **17**
Loan Fund, of Zoological Society, 63
Lobodon carcinophagus, 62
Longevity, of Congo Peacock, 61
of Costa Rican Quetzal, 30
of Silky Anteater, 133
Lutreolina crassicandata, 130

M

Macaque, Japanese, baby, **126**
Mahoney, Robert, **126**
"Mammals of the World," reviewed, 13
Manakin, Southern Long-tailed, 142
Mandrill, **Cover No. 4**
Martineta, 116
Massaro, John, Zoo Guard, **158**
McIlhenny, E. A., alligator research, 77
McMurdo Sound, Antarctica, 35, 151
Mech, Dave, "Mink: The Weasel of the Waterways," 87
Megadyptes antipodes, 123
Microciona prolifera, grows at Aquarium, 30
Miller, John L., joins staff, 157
Mink, **87**, 88, **89-90**
"Mr. Moto II," **126**
Moccasins, 76
Mockingbird, Patagonian, 45
Monitor, Komodo, Peking Zoo, 56
Monkey, Mona, **31**
Moustache, at Zoo, **145**
Proboscis, **66**, 67-69, **70-73**
Silver Leaf, 68
Spider, using tail, **48-49**
Talapoin, at Zoo, **48**
Talapoin baby, born at Zoo, 188
Montreuil, Paul, named Aquarium director, 29
brings seals to Aquarium, 62
"Seal Island," 173
Moose, angry, **182**
Mouse-Deer, at Zoo, 133
Mueller, Carl E., Cornell student at Zoo, **141**, 142
"Mwasi," gorilla baby, **99, 103**
Myiopsitta monacha, 40, **42**

N

Nasalis larvatus, 67
National Science Foundation, grant by, 35
Nickerson, Richard A., Cornell student at Zoo, **141**, 142
Nigrelli, Dr. Ross F., **124**
Nyala, **111**

O

Octopus, Pacific Giant, at Aquarium, 127
Oeming, Al, "China — A Land of Zoological Rarities," 50
"Olaf," Aquarium's Atlantic Walrus, **Cover No. 3**
Olingo, at Zoo, 133
Opossum, Black-shouldered, 131, **132**
Thick-tailed, **130**
Water, **131**
Orang-utan, fountain for, 60
sent to Hanover Zoo, 125, **126**
Ordway, Paul H., statement by, 91
Osborn, Fairfield, **124**
book translated, 126
Editorial:
"The Tide Is Running Strong," 1
"Animals and Stars," 33
"Those Who Return to the Sea," 65
"The Symbol and It's Meaning," 97
"The Timing Was Ideal," 129
"Let's Call It — Progressive Evolution," 161
Laboratories of Marine Sciences, cornerstone laying of, 124
Ostrich, Masai, young at Zoo, **81**
growth of, **133**
Otter, Giant, at Zoo, 133

P

Palm-civet, Small-toothed, at Zoo, 133
Panda, Giant, **51**, 54-56
Lesser, Peking Zoo, 55
Pangolin, at Zoo, 133
Panthera pardus japonensis, 52
tigris longipilis, 52
tigris amoyensis, 52
tigris coreensis, 52
tigris summatrae, 55
uncia, 55
Parakeet, Cotorra, 40
nest of, **42**, 43
Burrowing, **45**
Lesser Patagonian, 40, **44-45**
Patagonia, Argentina, 115, 134
Pawley, Ray, "Housekeeping for Marine Iguanas," 146
Peking Zoo, **52-54**
Pelican, Red-backed, **110**
Penguin, Blackfoot, 117
Galapagos, 117
Humboldt, 117
Magellanic, **115-121, 123,** 134, 136, 137
Magellanic albino, **118-119**
New Zealand Yellow-eyed, 123
Penguin House, improvement of, 62
Perrault, Michele, **81**
Petaurista breviceps, **125**
Petaurus breviceps, **131**
Phalacrocorax atriceps, 140
bougainvillii, 140
magellanicus, 140
Pharomachrus mocinno eastaricensis, longevity of, 30
Pheromones, used in communication, 182
Phocaena phocaena, 157
Photography in the Zoo, **109-114**
Pintails, Chilean, 43
Planigale ingrami, 162, **163-166**
Ingram's, 162, **163-166**
novaequineae, 163
Plover, African Spur-winged, **79**
Egyptian, 156
Pluvianus aegyptius aegyptius, 156
Porpoise, Harbor, at Aquarium, 157
Possum, Striped, first at Zoo, 187, 188
Potto, Golden, at Zoo, **132**
Prairie Dog, display of, 159
Presbytis cristatus ultimus, 68
Pseudois nayaur, 56
Pteronura brasiliensis, 133
Pteropus giganteus, at Zoo, 187, 188
Ptilogonys caudatus, 22
cinereus, 22
Puma, Peking Zoo, 55
Puffin, Common, 82, **83-86**
Tufted, arrival at Zoo, **157**
Pygopus lepidopodus, **17**
Python, Indian Rock, coiled around eggs, **48-49**
research on, 94

Q

Quetzel, Costa Rican, longevity of, 30
Quinn, Mickey, 48

R

Rabb, Dr. George P., 146
Ray, Dr. Carleton, **36**
and William E. Schevill, "The Noisy Underwater World of the Weddell Seal" Part 1, 35; Part 2, 151
correction about, 188
named Curator of Aquarium, 29
Rangifer arcticus, communication by, 182
Reindeer, Shanghai Zoo, 54
Reptile House, **76-77**
Richdale, L. E., 123
Rhinoceros, sparring in Zoo, **112**
Rhinopithecus roxelanae, 52
Ringtails, 104
Rockefeller, Laurance S., White House Conference, 91
Rusk, Dr. Howard, statement by, 97

S

St. Lucia Serpent, **20**
Salamander, Giant Aquatic, 76
Sambar, Szechuan, Peking Zoo, 56
"Sandra," Orang-utan, **126**
Saunders, D. R., "Sharing an Island with Puffins," 82
Savidge, John, writes on elephants, 29
Schaller, George, 33
Schevill, William E., **38**
and Carleton Ray, "The Noisy Underwater World of the Weddell Seal," Part 1, 35; Part 2, 151
Schuchman, Stephen M., Cornell student at Zoo, **141**, 142
Schulze-Westrum, Dr. Thomas, animal gifts to Zoo, 132
Sciurus variegatoides, at Zoo, 132
Scopus umbretta bannermanii, **47**
Seal, Crabeater, at Aquarium, 62
Elephant, **2-12**
Gray, pups at Aquarium, **15**
Weddell, **Cover No. 2, 34,** 35, **36, 37,** 38, **39,** 151-**154**
at Aquarium, 62
Seal Island, **173, 174**
Sealion, stray at Aquarium, 157
Serow, Peking Zoo, 56
Seth-Smith, David, "Parakeets," 44
Setifer setosus, 133
Sewellel, at Zoo, 133
Sheep, Blue, Peking Zoo, 56
Shag, Blue-eyed, 139-140
Rock, 140
Shanghai Zoo, 52-54
Shrew, Malaysian Tree, **17**
Silky-Flycatcher, Gray, **22-27**
Long-tailed, 22
Simla, bat detection at, 93
Skua, 115, 137, **138**
Skunk, Spotted, 104-108, **105-107**
Skutch, Alexander F., "Birds in a Costa Rican Garden," 168
"The Silky-Flycatcher," 22
Smith, Ellison, joins staff, 60
Solenodon, Hispaniolan, at Zoo, 132
paradoxus, 132
Spencook, Stephen, **184**
Spheniscus demersus, 117
humboldti, 117
magellanicus, 117
mendiculus, 117
Spilogale putorius, 104
Sponge, Red Beard, groups at Aquarium, 30
Springhaas, at Zoo, 133, **143**
Squirrel, Flying, at Zoo, **143**
Variegated, at Zoo, 132
Stempien, Dr. Martin F., Jr., 62
Sterling, Fred, Keeper, 102, **103**
Stilt, Black-necked, **Cover No. 1**
at Aquatic Birds Building, **144-145**
Sugar Glider, **125**, 131
Swan, Blackneck, 42
Swanson, Prof. Gustav A., Cornell Univ., 141

T

Takin, Common, Peking Zoo, 56
Golden, **51**, 56
Talapoin, received, 30
baby born, 188
Tamandua, at Zoo, 133
Tanager, Bay-headed, 169, **170**
Golden-masked, 169
Silver-throated, 169
Speckled, **168**, 169
Tangara, in Costa Rica, 168
Television, Channel 13 party, 31
reaction of Great Apes to, 30
Tenrec, Common, at Zoo, 133
Tern, Inca, **141**, 142
Tiger, "chuffling" **57**, 58, 59
Manchurian, **50**
Sumatran, Peking Zoo, 55
Tinamou, Crested, 45, 136
Tortoise, Giant, study of, 142
"Toto," new African Bush Elephant, **186**, 188
Tragulus javanicus, 133
breeding award, 187
"Tunuka," gorilla baby, **99**

U

Uakari, Bald, **110**

V

Vampyrum spectrum, at Zoo, 187, **188**
birth of, 188
Van Gelder, Dr. Richard, to lecture, 188
Vinegar, Allen, Visiting Research Fellow, **48**
Vogt, Dr. William, tour by, 91

W

Walker, Ernest P., "Mammals of the World," 13, **14**
Walrus, Atlantic, at Aquarium, **Cover No. 3, 17**
Waltz, Gus, **100, 102**
Wapiti, Manchurian, 52, 56
Watkins, William A., 35, **38**
Wild Animal Propagation Trust, 95
Williamson, Dr. Weaver M., 146
Woghin, Linda, **81**
Wolf, Gray, at Zoo, 187, 188
Woods Hole Oceanographic Institute, 35, 151
World of Birds, Cotorra exhibit planned for, 44

Y

Yak, Wild, Peking Zoo, 56
Yapok, **131**

Z

Zoological Park, attendance, 31, 95, 127
births at, 31, 159
water saving at, 124
Zoological Society, members' meeting, **30**
membership figure, 30
Zoology course, for keepers, 94

Contents

No. 1. JANUARY-FEBRUARY

The Tide Is Running Strong . . . . . *Fairfield Osborn* 1

Counting Elephant Seals on Punta Norte . . . . *William G. Conway* 2

"Mammals of the World" . . . . . *Joseph A. Davis, Jr.* 13

Zoo & Aquarium News in Pictures . . . . . *Sam Dunton* 15

A Tangle of Serpents . . . . . *Hernon G. Dowling* 18

The Silky-Flycatcher . . . . . *Alexander F. Skutch* 22

News from the Conservation Foundation 28

Behind the Scenes 29

No. 2. MARCH-APRIL

Animals and Stars . . . . . *Fairfield Osborn* 33

The Noisy Underwater World of the
Weddell Seal (Part 1) . . . . *Carleton Ray & William E. Schevill* 34

Apartment-building and Cliff-dwelling Parrots . . . *William G. Conway* 40

Zoo News in Pictures . . . . . *Sam Dunton* 47

China – A Land of Zoological Rarities . . . . . *Al Oeming* 50

The Fine Art of "Greeting" Tigers . . . . . *Joseph A. Davis, Jr.* 57

Behind the Scenes 60

No. 3. MAY-JUNE

Those Who Return to the Sea . . . . . *Fairfield Osborn* 65

The Proboscis Monkey . . . . . *James A. Kern* 67

Our Crocodilians Like It Hot . . . . . *Herndon G. Dowling* 74

Zoo News in Pictures . . . . . *Sam Dunton* 79

Sharing an Island Home with Puffins . . . . . *D. R. Saunders* 82

Mink: The Weasel of the Waterways . . . . . *Dave Mech* 87

News from the Conservation Foundation 91

Behind the Scenes 92

No. 4. JULY-AUGUST

The Symbol and Its Meaning . . . . . *Fairfield Osborn* 97

Four Baby Gorillas — Four Personalities . . . . . *Charles P. Gandal* 98

Spotted Skunks Make Interesting Neighbors . . . . . *Frank F. Gander* 104

It's Easy to Take Good Photos of Animals in the Zoo! . . . *Sylvia C. Bergel* 109

The Penguin Metropolis of Punta Tombo . . . . *William G. Conway* 115

Behind the Scenes 124

No. 5. SEPTEMBER-OCTOBER

The Timing Was Ideal . . . . . *Fairfield Osborn* 129

It's a Great Year for Rarities . . . . . *Joseph A. Davis, Jr.* 130

A Close Look at Argentine Wildlife . . . . . *William G. Conway* 134

They Learned About Animals by Work and Research . . *William Bridges* 141

Zoo News In Pictures . . . . . *Sam Dunton* 143

Housekeeping for Marine Iguanas . . . . . *Ray Pawley* 146

The Weddell Seal at Home (Part 2) . . *William E. Schevill & Carleton Ray* 151

We All Ritualize Our Behavior Sometimes . . . . . *Jocelyn Crane* 155

Behind the Scenes 156

No. 6. NOVEMBER-DECEMBER

Let's Call It — Progressive Evolution . . . . . *Fairfield Osborn* 161

Australia's Little "Needle-in-a-Haystack" Marsupial . . . . *David Fleay* 162

Birds in a Costa Rican Garden . . . . . *Alexander F. Skutch* 168

Seal Island . . . . . *Paul Montreuil* 173

Daily Scenes in Our New Home for the Water Birds . . *Joseph F. Morsello* 175

Messages in the Wild . . . . . *Margaret Altmann* 179

Boa Constrictor: from Tropical Menace to Popular Pet . *Herndon G. Dowling* 183

Behind the Scenes 186

Index to Volume LXVIII 190

Two Nights at the Waldorf-Astoria

This coming January we have had to schedule the annual Members' meeting of the Zoological Society on *two successive nights* at the Waldorf-Astoria. The programs will be identical and the dates are:

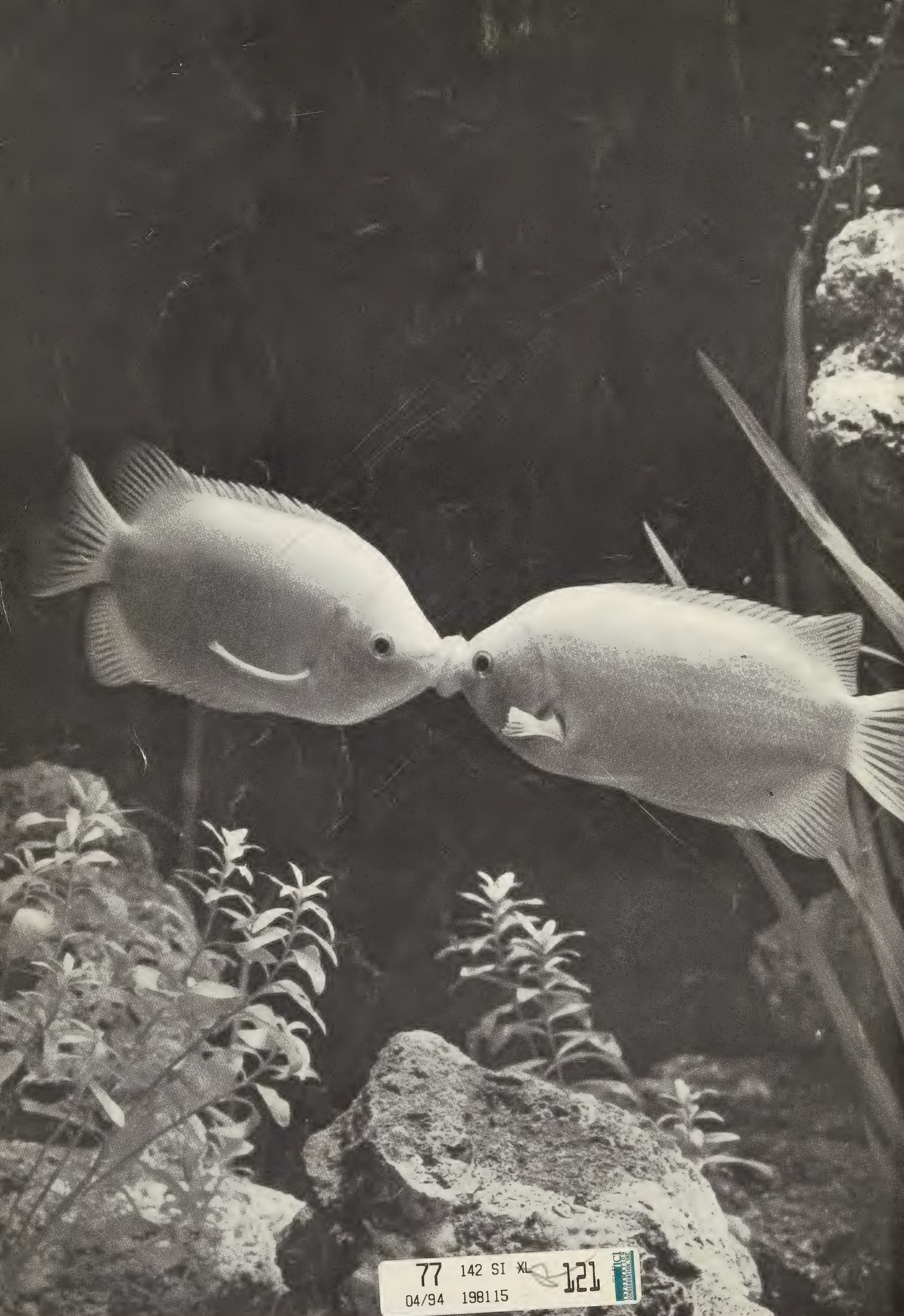
WEDNESDAY, JANUARY 12, 1966

THURSDAY, JANUARY 13, 1966

Why two nights? Simply because the Grand Ballroom of the Waldorf isn't big enough to hold the Society's increasing Membership in one evening.

Invitations and Arrangements. In early December, Members will receive their invitations to the meeting. Membership will be divided into two equal parts, alphabetically. One half will receive an invitation to the January 12 program, the other half will be invited for January 13. If the evening to which you are assigned is *not* convenient, you can request an exchange to the alternate evening.

The Program. Exhibits of live animals, motion pictures, Dr. Osborn's always-brief report on the year—all will be identical on the two nights. Oh, maybe the Prairie Dogs will pop out of different holes on the different evenings, the Suricates are sure to pat the sandy floor of their compartment in different places, and maybe the Aquarium's fishes will glow and glitter in a different cadence. But the effect will be the same—delightful!


77 142 SI XL 121
04/94 198115
SMITHSONIAN INFORMATION CONSERVATION INC

SMITHSONIAN INSTITUTION LIBRARIES
3 9088 01060 6200